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Agriculture

The Journal of the Ministry of Agriculture

DIAMOND JUBILEE ISSUE

VOL. LXI No. 6

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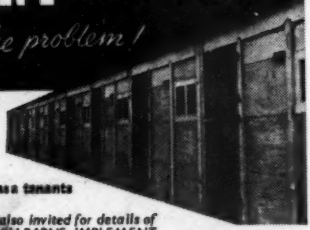

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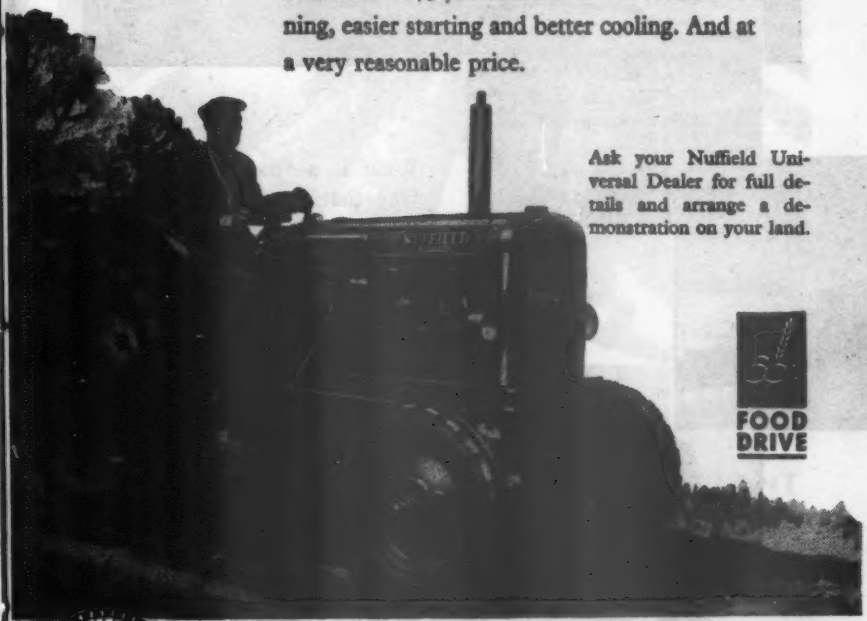

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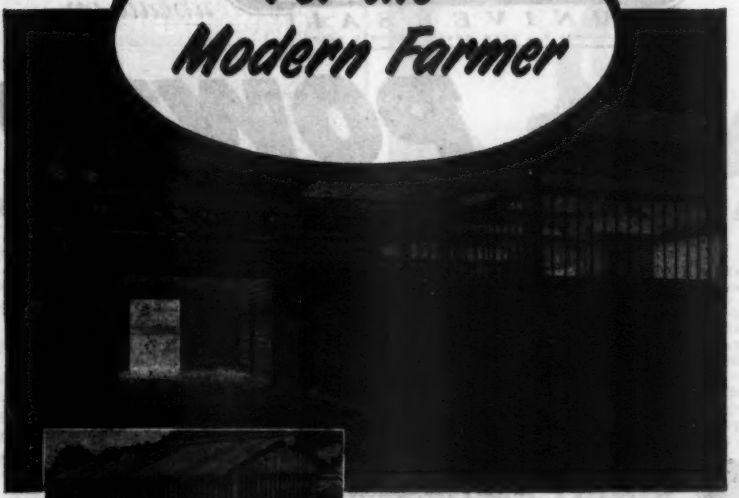

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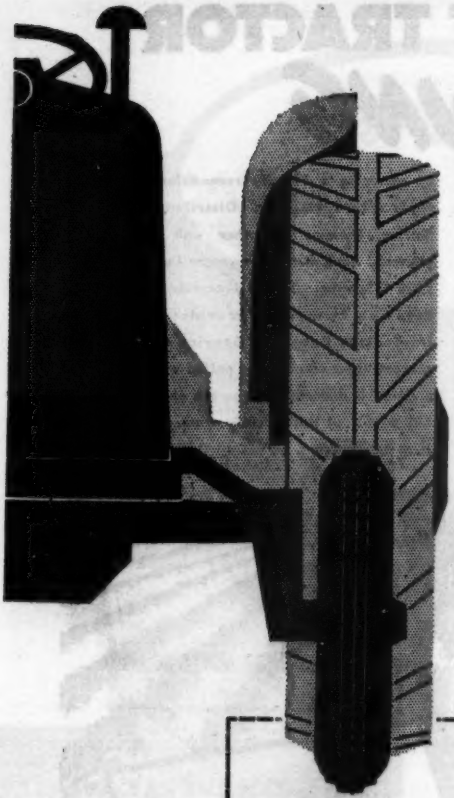

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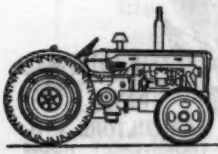

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AGRICULTURE

THE JOURNAL OF THE MINISTRY OF AGRICULTURE

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VOL. LXI No. 6 SEPTEMBER 1954

1894 • *DIAMOND JUBILEE* • 1954

Contents

	Page
Foreword. *The Rt. Hon. D. Heathcoat Amory, the Minister of Agriculture and Fisheries*	253
Sixty Years of Science. *Professor Sir James A. Scott Watson*	254
Agricultural Research in Great Britain. *Professor Stephen J. Watson*	258
Progress in Animal Health and Practice. *Sir Thomas Dalling*	260
Rural Revolution. *C. S. Orwin*	264
Rural Landownership—Yesterday and Today *The Earl St. Aldwyn*	269
Farm Labour Since 1894. *Alderman E. G. Gooch*	272
Agriculture and the Man in the Street. *Tristram Beresford*	276
Power at the Farmer's Elbow. *Maitland Mackie, Jnr.*	278
Land Enduring. *S. R. O'Hanlon*	282
Horticulture in the Half-century. *F. A. Secrett*	283
Welsh Agriculture in Transition. *J. Morgan Jones*	286
Who Serve the Land. *Alec Hobson*	289
Farming in the News. *J. Robertson Coupar*	291
Farming on the Air. *John Green*	293
Our Climate. *L. P. Smith*	297
I Remember	301
Then and Now	308
Book Reviews	310

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To pastures new

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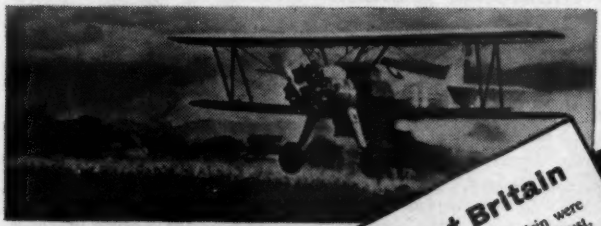
The new Shell plant under construction at Pernis in Holland, and costing over £1,250,000, will be in large scale production by the end of the year—to ensure plentiful supplies of aldrin and dieldrin for the British market in 1955



Cotton crops have many pests and are now widely protected by the application of both aldrin and dieldrin. Here, in South America, application of aldrin is being made from the air at low level.

Aldrin is now a major weapon in the destruction of locust plagues. The photo shows dead hoppers after spraying.

Progress Report from Great Britain

Following extensive field trials in 1952 and 1953, aldrin and dieldrin were made available for British farmers early this year in Aldrex Wireworm Dust, Aldrex 30 Emulsion and Dieldrex 15.

Aldrin was also available in well known fertilisers, making the application of insecticide and fertiliser in one operation a practical proposition for the first time.

Supplies were, however, limited, as dollar payments were involved, and many farmers were disappointed; those who were fortunate enough to get them before the "sold out" notices went out, had reason to bless their luck.

Aldrex has given excellent control of Wireworm and Leatherjacket, while Aldrex, as a foliage spray, has been particularly effective against Cabbage Root Fly and Carrot Fly.

The fact that aldrin and dieldrin do not cause taint has been substantiated, and crops treated with these materials have been accepted by the canning factories and the Potato Marketing Board.

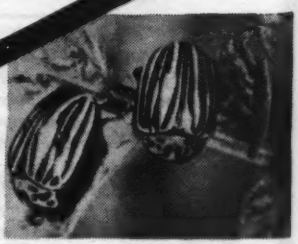
A famous sheep dip manufacturer has chosen dieldrin to give greatly prolonged protection against Blow Fly "strike."

Extensive trials with aldrin and dieldrin for seed dressings have confirmed the successful results of similar trials here and in other parts of the world in previous years; dieldrin has also been used effectively for the control of pests of stored grain.

The possibilities for these materials are immense, and, although our knowledge of their capabilities amply justifies the claims and recommendations already made, extensive development work continues.

For 1955 both aldrin and dieldrin will be freely available to farmers and to manufacturers of insecticidal preparations, many of whom are already planning their marketing programmes.

United States maize crops are now widely treated with aldrin—often applied with fertilizer—for the control of the highly destructive Corn Root-worm. The success of aldrin is evident from the better growth of the cobs in the farmer's left hand.



In Switzerland, more than half the treated potato acreage is now protected by dieldrin against attack by Colorado Beetle.

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AGRICULTURE

THE JOURNAL OF THE MINISTRY OF AGRICULTURE

VOL. LXI No. 6 SEPTEMBER 1954

1894 • *DIAMOND JUBILEE* 1954

FOREWORD

by

The Minister of Agriculture and Fisheries

The Introductory Note to the first issue of this Journal by the Board of Agriculture in September 1894, reveals the modest function which it was intended this periodical should fulfil :

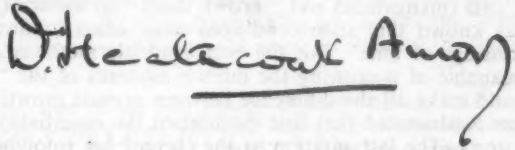
> *The Board have been in the habit of issuing from time to time, as the necessity arose, leaflets dealing chiefly with insects and other pests injurious to agriculture, and this form of publication has been found useful on occasions when it has been expedient to insure a rapid and effective circulation.*
>
> *There is, however, accessible to the Board, information of a less urgent character, but possessing more or less interest for agriculturists in this country. With the double object of providing a suitable channel for giving publicity to such information, and securing a medium for systematically recording certain statistical and other intelligence which could not be seasonably or conveniently inserted in the annual publications of the Department, the Board have deemed it desirable to issue a quarterly Journal.*

From this practical beginning, "Agriculture", as this Journal came to be called in 1939, has steadily grown in status and influence as its service to practical farming and horticulture has widened with each passing year.

The changes in the agricultural industry, and indeed in rural life generally, during the past sixty years have been a revolution. Something of those times with their troughs of depression and peaks of prosperity, are reflected in several of the articles in this commemorative issue.

Today, the importance of the agricultural industry of Britain is recognized as fully and as universally as at any time during this Journal's existence. Very complicated and difficult problems will no doubt have to be faced in the future as they have in the past, but whatever the future may hold in store for us I am sure that this Journal can and will continue to play its part in bringing useful knowledge to the farmer, inspiration to the student, and interest to the man in the street, both at home and overseas.

I am glad of this opportunity of wishing it well on its journey forward from its Diamond Jubilee to its Centenary—particularly as I think it unlikely, on the whole, that on that happy future occasion I shall be in a position as Minister to contribute an appropriate Foreword.



SIXTY YEARS OF SCIENCE

PROFESSOR SIR JAMES A. SCOTT WATSON, C.B.E., LL.D.
Chief Scientific and Agricultural Adviser,
Ministry of Agriculture and Fisheries

IT is impossible, in a short article, to cover all that this title might be taken to embrace ; what is in fact attempted is to point to the more important achievements of two generations of chemists and biologists in the fields of plant nutrition, plant breeding, crop protection, animal breeding and animal nutrition.

Soil Science and Plant Nutrition The farming problems that first excited the curiosity of scientists were those of soil fertility. The answer to the most important of these had been provided by Rothamsted some fifty years before this JOURNAL came into being. The answer was that the nutrients most often deficient in the general run of farm soils were nitrogen, phosphate and potash. By 1894, superphosphate and potash salts had long found their respective places alongside the bones, guanos, rape cake and Chilean nitrate of earlier days, while by-product sulphate of ammonia was being produced, in growing amounts, by the increasing number of gas works. The latest news in 1894 was that the vast heaps of basic slag which had accumulated over the years could be turned into useful fertilizer by a process no more elaborate than grinding to a high degree of fineness.

The greatest anxiety of the time was about the future supply of fertilizer nitrogen ; in 1900 Sir William Crooks, in his Presidential Address to the British Association, called attention to the fact that assured supplies would fall greatly short of long-term needs. It had indeed long been known that leguminous plants, unlike all others, were independent of supplies of soil nitrogen—indeed, they left the soil richer than they found it—and in 1889 the story of nodule bacteria had been unravelled by two German workers. But, as Crooks remarked, it would hardly do to tell the farmer that he must grow clover in order that he might grow wheat.

Two processes for "fixing" atmospheric nitrogen were devised before the First World War—producing cyanamide and nitrate of lime respectively—but neither was really suitable for general use or large-scale development. It was during the war (and to the end of producing bombs and shells) that German chemists invented the efficient process that is now in use. Thus did great good come out of very great evil.

It had long been known that, in particular soils, some "major" nutrient, other than the classical three, might be lacking. For instance, many of the old books include gypsum in their list of manures, but the increasing use of superphosphate and sulphate of ammonia had made good the sulphur deficiency wherever this had existed.

Farmers in some districts had long been familiar with conditions that we now know to have been due to trace element deficiencies—"grey-leaf" in oats (manganese) and " brown heart " in turnips (boron). Moreover, it was known that such conditions most often followed heavy or excessive dressings of lime. But the best available methods of analysis were quite incapable of measuring the minute amounts of the " trace elements " that could make all the difference between normal growth and crop failure. It was Rothamsted that first established the essentiality of a trace element—boron. The last addition to the current list (molybdenum) was identified

only a very few years ago—in Australia, where great stretches of land, once useless as pasture, have been made to grow lush crops of clover by supplying the missing element at the rate of a fraction of an ounce per acre. The probability is that the list is now complete. Long Ashton has played a major part in the drama.

Meanwhile, the story of the nodule bacteria had turned out to be much less simple than at first it appeared. Not only did each group of legumes—clovers, lucerne, beans, etc.—have its own type of the organism, but, as Rothamsted showed, specific strains might be more or less efficient in the role of nitrogen fixation ; moreover, a useful strain might occasionally go to the bad and become a parasite rather than a partner. In this country the inoculation of lucerne seed was the most valuable outcome of these discoveries.

But it would, of course, be wrong to suppose that the mysteries of soil fertility have all been solved. For instance, we do not yet understand the processes by which applied phosphate becomes fixed in the soil in unavailable form, and we must still continue to put in several times as much as we hope to take out in the form of crops or livestock produce. Moreover, the soil is much more than a reservoir of plant nutrients ; its cropping capacity depends also on its ability to store water and on its permeability to both water and air—for plant roots can be drowned or suffocated ; and ease or difficulty in procuring a good and stable tilth depends not only on the soil's mineral make-up but also on the products of a multitude of bacteria and other lowly organisms. Hence the emphasis, in soil research, is now shifting from the chemistry of plant nutrients to factors affecting physical structure.

Plant Breeding The total contribution of the plant breeder to farming progress has been great indeed, but practical results have varied widely as between one group and another of the crop plants. In 1894 a majority of the cereal varieties—Scotch Potato oat, Chevalier barley and Squarehead's wheat—had been found rather than bred. But the range of genetic material was wide, hybridization was easy and, since cross-pollination in the field was rare (except in rye), new combinations of desirable qualities could be readily made and fixed. Hence, in the main, cereal breeders have been able to produce (with a time-lag of about a decade) what has been needed to meet the changing demands of the grower—stiffer or shorter straw, greater responsiveness to fertilizers, improved malting quality, resistance to specific diseases, etc.

But other groups have presented difficulties. In the case of the field bean, the so-far insuperable obstacle has been a " shortage of genes "—a lack of the variety of building materials required to put together the desired structure. In that of the grasses and clovers the main obstacles were the prevalence of cross-pollination (by wind or insect), combined sometimes with self-sterility and almost universally with a catastrophic loss of vigour on in-breeding. But it has proved that the improved or "pedigree" strains of herbage plants, essentially unstable as they are, can be maintained, in useful shape, through continued selection of mother plants, with adequate isolation of seed crops during the process of multiplying up to provide the farmer's seed. Aberystwyth has become a household word throughout the pastoral world.

Another place-name, that of the tiny village of East Malling in Kent, is equally familiar to the world's fruit growers, especially with reference to

the effect of the rootstock on the habit of growth of the tree and the quality of its fruit.

Many crop plants, like most farm animals, deteriorate in vigour and in yield on inbreeding, yet crosses between inbred lines may be more vigorous and productive than plants derived from continuously out-bred stock. The practical exploitation of this phenomenon of hybrid vigour was easily possible in the case of maize, since the male and female flowers are borne in separate inflorescences, and the former can thus be easily removed to ensure than no selfing shall occur. The use of hybrid seed in the United States has raised the yield of the crop, at almost negligible cost, by some twenty-five per cent. It may be that the principle can be applied in other cases ; for instance, a male-sterile type of sugar beet, grown in alternate rows with a normal form, produces hybrid seed.

Today's plant breeders, with the aid of new tools, are attempting adventurous experiments—crossing wheat with couch grass to make a perennial cereal ; crossing wild species of potato with the cultivated form, in the hope of obtaining immunity to the blight and even the eelworm. The doubling up of chromosome numbers—the accidental process by which wheat evolved from its grass ancestors—can now be induced artificially. But meantime it would be rash to count on revolutionary results.

Crop Protection The last decade has seen a rate of progress in crop protection that has never been approached at any time in relation to any of the farmer's problems. The pace is still a giddy one ; new weapons are being added to the farmer's armoury almost month by month, and the list of victims—weeds, insect pests and crop diseases—is rising correspondingly. The charlock and the poppy need no longer brighten the farming landscape ; the wireworm, leatherjacket and flea beetle can be slaughtered at small expense ; the grower of hops or Brussels sprouts can poison the greenfly via the plant sap; the Codling moth and the Red Spider need no longer plague the apple grower.

As to some other pests, it is interesting to speculate about the outcome of the friendly rivalry between the plant breeder and the crop protection chemist. Shall we win the battle against the Potato eelworm by chemical treatment of the soil or by breeding a potato that can regard the eelworm with indifference ? Shall we defeat the sugar beet virus yellows by eliminating the greenfly that obligingly carries it about our fields, or shall we produce a sort of beet with an armour that the virus cannot penetrate ? Of much more concern is the question whether the story of the American house fly will be repeated—will the charlock find a means of defence against MCPA and DCPA, as the house fly has achieved immunity against the whole armoury of insecticides ? There are, fortunately, some good reasons to hope that these things may not happen. But there are already indications that resistant weeds, like wild oats, may benefit by the elimination of their fellows.

Livestock Breeding At the turn of the century there were high hopes that the discoveries of Mendel might enable the breeder to turn his old craft into something of an exact science. This has not happened ; in the main we still use the methods that Bakewell employed nearly two centuries ago. We try to breed the best to the best ; we try to judge the sire by his progeny ; and we inbreed a little more or a little less in the hope of " fixing type " without overmuch sacrifice of vigour. We have indeed devised some new tools—herd books, milk records and mathe-

matical measures of heritability or inbreeding—but these provide no more than refinements of old-established methods. There is, however, one new approach to the old problem of reconciling fixity of type with hybrid vigour. This is to apply the system that has proved so successful with maize—the production of extremely inbred lines, from which the highly undesirable genes will have been eliminated, and the synthesis of the commercial animal, with a full complement of good genes and a maximum of hybrid vigour, by crossing up the inbreds. In the case of pigs and poultry a considerable measure of success can be recorded.

It is the work of the physiologist, rather than of the geneticist, that has so far brought major benefits to the breeder. The incidence of infertility has been reduced as the various causes have been identified, the potential value of the good sire has been vastly increased by the development of artificial insemination, and we have been given a new understanding of the problems of growth, development and carcass quality of meat animals. In all this Dr. John Hammond has led the way.

Animal Nutrition The first crude " feeding standards " go back more than a century, but these were based largely on feeding trials, rather than on an understanding of nutritional needs. The early scientists—Kellner and Armsby being the most noted—made a considerable advance in determining energy and protein requirements for maintenance, growth, fattening, milk production, etc., the general assumption being that, apart from energy and protein, the only need was for bone-forming minerals and common salt.

The first of the vitamins was identified in 1900, and the list has now increased to nearly a score. Moreover, it has been shown that animals, like plants, require traces of other elements, such as cobalt and copper. Again, in the case of the pig and the fowl, the essential amino-acids have been identified, and the quality of protein can be assessed in relation to needs. Thus feeding practice, in the case of the pig and the fowl, can be soundly based on scientific principles.

By contrast, the feeding of ruminants is still based mainly on experience and on trial-and-error experiments. The original conception of the rumen as a storage room for food awaiting mastication and digestion, has proved to be completely mistaken ; in fact, it is a fermentation vat in which highly complex changes are brought about by hoards of living organisms. The normal machinery of ruminant digestion is far from being fully understood, and hence it is not remarkable that the scientist cannot yet explain how or why it sometimes gets out of gear—as in the case of bloat or twin-lamb disease. But the needed research is being done.

Experimental Methods We must not omit mention of the contribution of mathematics to the progress of farm science. In the nature of things, many investigations—the testing of varieties, the measurement of responses to fertilizers or the assessment of the comparative values of feedingstuffs—must be carried out under imperfectly controlled conditions. The modern randomised block or Latin square layout, as compared with the single-plot trial of early days, gives at once a much higher degree of accuracy and also a measure of its own precision, and of the degree of significance that may be attached to results. England, under the leadership of Sir Ronald Fisher, has led the world in this particular field.

AGRICULTURAL RESEARCH IN GREAT BRITAIN

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IT is surprising that the system of agricultural research, as we think of it, has been developed only during the period that the Journal of the Ministry of Agriculture has been in existence. With the exception of Rothamsted, by far the oldest, all the agricultural research stations have been set up within the last sixty years. New stations have, of course, to be considered from time to time to make sure that every subject is properly catered for, and the most recent example is the Scottish Horticultural Research Institute, which was started early in 1951.

Apart from Rothamsted, which was founded in 1843, there was always a certain amount of research work going on in the agricultural field, and the results are to be found in the transactions of the two major agricultural societies—the Royal Agricultural Society of England and the Royal Highland and Agricultural Society—as well as in papers published from various institutions, such as the universities, and from colleges like the Royal Agricultural College at Cirencester.

In the early days much valuable work was also being done by the advanced farmers and the landowners, and in the early transactions of the above-mentioned agricultural societies are to be found a number of most valuable and interesting accounts of really sound observation and experiment. Then, as today, the rural population was prepared to examine and compare any new theory or material suggested for the improvement of agriculture or horticulture, and this work was fostered and often financed by the agricultural societies, as well as by private purses.

It is well known that Rothamsted was financed in its early days by Sir J. B. Lawes, but many persons also carried out research at their own expense ; for example, Dr. (later Sir) David Wilson, who in the 1860s followed up the work of such people as Carruthers and Way at Cirencester and worked out the composition of the grasses and clovers in relation to their stage of growth in a manner which has never been surpassed and has been completely confirmed by all subsequent workers. There are many such examples, but the problems of those days were relatively simple, and whilst they shed light on the subject, they touched only the fringe of it.

At the beginning of the century the agricultural research worker could, and frequently did, interest himself in many different facets of agriculture. Sir John Russell, for instance, is looked upon as a distinguished soil chemist, but in 1908 he published a series of elegant papers on the chemistry of ensilage which stand today as models of accurate work in this field.

Progress in Research Techniques The most striking feature of progress in agricultural research in the first half of the present century is the almost unbelievable progress which has taken place in the experimental techniques, the greatly increased accuracy in our measurements and the vastly improved apparatus for obtaining them. These, together with modern statistical methods, both of designing and of assessing the results of experiments with either crops or animals, have revolutionized agricultural research.

One of the results of this advance in research techniques has been to develop a high degree of specialization in the research worker. It is to

be hoped that this does not increase to the extent that it becomes difficult to obtain people able and prepared to review the much wider field covered by the individual research stations at least ; and preferably perhaps that field and its relation to the industry as a whole. Such people are essential for the proper direction of our agricultural research stations and for the co-ordination of the work of their stations with the needs of agriculture as a whole. It cannot be done by committees, though bodies like the Agricultural Research Council and the Agricultural Improvement Council are constantly reviewing and integrating modern research work and surveying the practical problems which arise from day to day. They can, however, never take the place of the direct contact between the research stations and the industries that they serve, and it is most important that this should be fostered.

Anyone who wants to see exactly how much research work is in progress in the field of agriculture, using the term to include the closely allied horticultural industry, should look at the Index of Agricultural Research, 1953-54, published for the Agricultural Research Council by H.M. Stationery Office*. Such an examination will show that nearly every conceivable problem is being followed up at some research institute, agricultural college, or university department.

Great advances have been made as a result of the research that has already been completed, and it can be shown that they have either increased the production of crops and livestock or are effecting a large annual saving by preventing losses from diseases. These facts are easily demonstrable and are understood and accepted by the farmer and grower as a part of his everyday practice.

Following on the early work in the development of fertilizers, the plant breeder has done much to increase productivity. The modern knowledge of specific weed-killers has still further increased the crops by reducing competition. Improved feeding practices have meant a greater utilization of the bigger crops grown and this, together with the advances made by the animal breeder, have all contributed to an increased output. The fruit and vegetable grower is obtaining similar assistance and making full use of it.

Great strides have been made in identifying diseases of plants and animals and in developing methods of control. Much, however, remains to be done in the prevention of disease and to remove the basic causes, since prevention is always better than cure. This calls for long-term research with soils, crops, and animals, and here modern methods will be of the greatest assistance. But progress must necessarily be slow and results difficult to assess.

Short and Long-term Research Interlocked Sometimes research is divided into long-term, or fundamental, and short-term, or *ad hoc*, research. But this is a purely imaginary line of demarcation and it is impossible to measure the relative importance of the two types. In an effort to do so, some of the immediate problems tend to be overlooked, and they are really just as important a part of agricultural research as are the long-term projects. Luckily, the different advisory services in the country have some time available for research, and this is usually devoted to short-term problems, to which an answer is required for advisory purposes. The great difficulty however is that a seemingly simple problem may, when it appears to be solved, open up a much wider question,

* Price 5s. (5s. 3d. by post.)

and the farmer may become impatient because of the time involved in dealing with an apparently straightforward matter. The whole question of trace elements, for example, comes in this category, and in trying to cure one deficiency an imbalance may be caused and a second deficiency may appear. An interesting case in point was that of a cobalt deficiency which appeared in the pastures in the north-east of Scotland and affected farm stock. When cobalt compounds were added to the soil in an effort to correct the condition, it was found that care had to be taken as to the amount added. It had to be small, and if the safe quantity was exceeded then the animals on the pasture suffered from a different trouble, caused this time by an excess of molybdenum that developed in the herbage.

Again, a good deal of work has been done on grass, a most important crop, but we still require information to enable us to utilize it to the full. This entails a study of the relationship between soil and crop, of proper manuring, and of correct management of the animals grazing it or eating it in a conserved form. This may involve the soil worker, the plant breeder and animal breeder, the veterinarian, and the physiologist; indeed, some aspect of the work will be found in the programme of nearly every research station, college, or other body interested in agriculture.

Agricultural research can never be complete. It is bringing forward results all the time, but the farmer and grower must realize that to serve their industries properly any investigation must be thorough, and this takes time. It may actually be harmful to broadcast results too soon, though in practice it is clear that the enterprising farmer or grower often supplies the best testing ground for the practical application of the results of research.

PROGRESS IN ANIMAL HEALTH AND PRACTICE

SIR THOMAS DALLING, M.A., LL.D., D.Sc., F.R.C.V.S., F.R.S.E.

THE position occupied by livestock in the agricultural economy of countries throughout the world is being realized and emphasized more and more every year : for the need for products of animal origin to provide nutrition for the ever-increasing world population is great. It may not be fully understood that one of the important considerations in increasing such products is to improve the health of livestock, so preventing losses by deaths and raising productive capacity. Although veterinarians and others have at all times given much valuable assistance to livestock owners, during the last few decades concentrated efforts have been made to improve our knowledge of the causes of ill-health, to evolve methods of prevention of disease, and to apply such methods on an ever-increasing scale. The purpose of this article is to point to some of the important advances that have been made during the last half-century or so, and to comment on them.

The basis of improvement in methods and in the acquisition of knowledge must surely be research work : and in considering research work, we must not confine our thoughts entirely to laboratory procedures. The observer in the field and those concerned with the field application of results of laboratory and other studies must also be placed in the category of research workers, for without their collaboration progress would be slow and important results might remain unheeded. It has been of the greatest interest to

note how research work, for long starved of financial support, has claimed public attention in recent years, and how continued encouragement has been forthcoming.

During and immediately after the First World War, arising largely out of new knowledge acquired through the suffering of human beings, the anaerobic group of micro-organisms came into prominence as the cause of animal disease. It was shown that some of the diseases which affect sheep had micro-organisms of this group as their immediate cause, and following that discovery, methods of prevention were evolved. The heavy losses from lamb dysentery were checked, and although it was necessary to continue study for many years to appreciate fully the eccentric behaviour of *Cl. welchii* in its toxin production, even in the early days of the work the losses were greatly reduced. There is little doubt that these early researches into the anaerobic diseases of sheep stimulated research in both human and livestock fields.

Research into Cattle Diseases Progress made with the control of diseases of cattle includes work such as the control of brucellosis (contagious abortion) ; the eradication of bovine tuberculosis in areas throughout the country with, concurrently, the development and application of the comparative tuberculin test and the preparation of the purified tuberculin (PPD) ; the control of certain types of bovine mastitis ; and a better understanding of the causes and control of infertility, especially those of an infectious nature.

With the introduction of a reliable and safe vaccine in the form of that produced from *Br. abortus* strain 19, much progress has been made in controlling brucellosis in cattle. As with all new methods, the use of this vaccine was subjected to much criticism ; happily, it has long been accepted, not only in Britain but in many parts of the world, as a reliable agent, when used according to instructions and a definite plan, in controlling the infection. Livestock owners, however, must be warned against the tendency to drop vaccination too soon. Also in connection with the diagnosis of brucellosis, this country must receive the credit for evolving a standard anti-serum for use in the agglutination test and for standard techniques in carrying out the test and in its interpretation. This work has resulted in the acceptance of the anti-serum as an international standard.

While on the matter of standards, it may be pointed out that arrangements are now in progress for the provision of several standards against which the value of veterinary biological products may be measured in any part of the world : much of the necessary work in evolving these standards is being carried out in this country.

The speed with which bovine tuberculosis in cattle is being eradicated from Gt. Britain is truly astonishing. The various schemes, which have varied from time to time, have one thing in common ; namely, the use of the tuberculin test for diagnosing bovine tuberculosis. The tuberculins used over the past years have varied, as have the techniques of their use and the interpretation of the results or reactions. Gradually, there have been produced purified types of tuberculin (PPD), and the use of the two tuberculins—mammalian and avian—has gone a long way to resolving difficulties of interpretation of the results of the tests. This country has now reached a stage when, like some other Continental countries, the total eradication of bovine tuberculosis is in sight—truly a creditable performance. There has been a feeling that vaccination against tuberculosis in cattle deserved

earnest consideration. Careful experiments were carried out on a fairly large scale, both in the laboratory and in the field. It was obvious that under certain conditions it was possible to set up an immunity against subsequent infection by the use of the world-famous BCG living vaccine. However, it also became obvious that in a plan of campaign, such as is now in force officially for the eradication of bovine tuberculosis, vaccination could not find a place.

Our detailed knowledge on the microbial associations with bovine mastitis go back many years, and it is now a simple laboratory procedure to determine the nature of prevailing micro-organisms responsible for the changes in the udder of the infected cows. The introduction of some of the newer medicaments, especially antibiotics, opened up a new line of attack on mastitis in that their introduction into the udder by way of the teat canal brings them into direct contact with the offending micro-organisms. Some specificity of action seems to prevail in the action, especially of antibiotics, on the invading micro-organisms, and, although some types still appear to resist the action of all the available antibiotics, thanks to the work of chemists and biochemists it is probably only a matter of time before the specific substances will be found to deal with the difficult types of udder-invading micro-organisms. Mass treatment of herds, coupled with laboratory examinations, is now an everyday practice, resulting in an appreciable increase in milk yields.

Although infertility in cattle has been recognized from ancient times, it is within fairly recent years that detailed studies of the different causes have been carried out and better knowledge of them and their prevention has accrued. The infections associated with infertility are now well recognized, especially trichomoniasis and vibriosis. The part played by the bull in the transmission of these infections is now understood. The use of artificial insemination as a method of breeding has been of much assistance in this field. More information is still required on non-infectious causes of infertility : every year, however, sees further light shed on the subject, especially on the relationship of nutrition to fertility.

The rate at which artificial insemination as a method of breeding has spread throughout the world passes any estimate that could have been made even a few years ago. This method of breeding is one of the outstanding advances in animal husbandry, and with the discovery that semen can be kept in a live and fertile condition for months or even years, the possibilities of the results from its use are even greater.

A disease of cattle causing a good deal of concern is Johne's disease. Although considerable advance has been made in our understanding of the method of spread and in its control, there remain a number of gaps to be filled before we can be perfectly happy concerning its control.

Pigs and Poultry Pigs have not been neglected in research work. Possibly the most outstanding progress has been in the evolving of safe and efficient vaccines for the prevention of swine fever, a disease which causes much disorganization of the British pig industry. Extensive and carefully controlled experiments gave definite evidence of the usefulness of these vaccines when used under prescribed conditions.

Attention has also been given to poultry disease control. Pullorum disease (B.W.D.) can now be well controlled by the use of the agglutination test and the disposal of the positive reactors. The introduction of the rapid method of testing, which can be done on the farm, has resulted in increased

use of the test, with consequent beneficial results. Fowl pox can now be brought under control. Vaccine prepared from pigeon pox virus, although not setting up an immunity of long duration, is effective in preventing outbreaks and the spread of the disease, and has the advantage that it may be used even on very young chicks.

Although the method of controlling epizootics in this country is mainly by a slaughter policy, there are now available vaccines, prepared by some of the new virus techniques, which have been proved of marked value. There is little doubt of the importance of a slaughter policy in ridding a country of some of the highly contagious diseases ; in some countries, however, vaccination as an interim measure, leading eventually to the introduction of a slaughter policy, must have a place. While on the subject of slaughter policies, mention must be made of the control of foot-and-mouth disease. There is, in fact, no difference of opinion in the world over the effectiveness of control by a slaughter policy and all that it implies. Again, in this disease, vaccination, or a combination of vaccination and slaughter policies, will continue to be operated in some countries until such time that a full-out slaughter policy becomes economically possible. With the simpler and cheaper methods of production of foot-and-mouth disease vaccine, larger quantities can be made available to meet requirements. Unfortunately, the various distinct antigenic types of virus and the tendency of any type to mutate is a limiting factor in a vaccination scheme.

Some other Problems Diseases of dogs and cats have also been the subjects of intense study. The evolving of methods of control and prevention of canine distemper marked an advancement and, although during late years the picture of the disease appeared to become more complicated, gradually further information is being obtained to clarify the position. Infectious enteritis of cats has been shown as preventable by the use of suitable vaccine.

The extensive work on parasites, external and internal, must be mentioned. Parasitology, a long-neglected subject, has, bit by bit, found its rightful place in the research field, and many are the beneficial effects of the application of the methods of control worked out by the small band of research workers. Sheep scab has been virtually removed from Britain, thanks to the introduction of the newer, long-lasting chemical agents like benzene hexachloride. The study of the life history of the liver fluke and the use of a drug such as carbon tetrachloride have been of high value in preventing some of the extensive outbreaks of distomatosis to which this country had become accustomed. For a number of the round worm stomach infestations, phenothiazine and other medicaments are proving reliable parasiticides when used according to a set plan.

We must not forget the extensive and important work of chemists and biochemists and the contributions they are making to our knowledge of animal health and disease control. Their findings touch on many points, not the least of which concerns the action of trace, or minor, elements in the diet.

These are but a few examples of progress in research and the practical application of results in the field of animal health. Research and field work, going on side by side, are being continued at an ever-increasing rate. There are still many problems to be attended to, but now that the public interest has been stimulated and financial support is assured from different sources, we can look forward to greater and greater progress as the years go on.

RURAL REVOLUTION

C. S. Orwin, M.A., D.Litt.

IF we accept the Psalmist's dictum, some sixty years may be said to represent the conscious active lifetime of that hypothetical figure, the average man. Sixty years ago was enacted the Local Government Act which set up Parish Councils to secure popular control of the parish pump and to group representatives of each in District Councils for the administration of matters of mutual concern. Sixty years ago, the Board of Agriculture, constituted five years before, published the first issue of a periodical, the Journal of the Board. In the same year, the great agricultural depression of the last decades of the century plumbed its lowest depth.

Sixty years earlier (1834) landowners and farmers were still basking in the sunshine of the protection afforded by the Corn Laws, and sixty years before that (1774) farming in the open fields still prevailed in many hundreds of parishes ; the pioneers of farming progress, a few of the great landlords, the livestock improvers, the soil and tillage experts, were only just beginning to appear. Thus the working lifetime of three average men spans the change from the traditional subsistence farming of centuries to farming with the help of every known mechanical invention and the lessons of scientific research—all of it accompanied by changes in the conditions of labour on the land amounting to social revolution.

End of an Era The depression which culminated in 1894, marked the beginning of a great shift in the control of food production in England, which the next half-century was to complete. More than 90 per cent of the farming land was occupied on the landlord-and-tenant system, and speaking generally, the landowner had complete control of the farming practice through the terms of the lease or the tenancy agreement. These laid down categorically the cropping rotation to be followed, and even the cultivations to be performed ; certain crops (hay, straw and roots) might not be sold off the farm ; others (turnips and swedes for seed, hemp and woad) might not be grown at all for fear of ruining the land ; permanent pasture was "sacred" ; in addition, the liabilities of either party for the payment of taxes and charges, and for the maintenance of the equipment of the holding, were strictly defined. An Act of Parliament passed only in 1883, on the other hand, specified a schedule of improvements to the holding for any of which, if effected by him, a tenant was entitled to receive compensation on quitting.

Perhaps the most striking effect of the agricultural depression was the death-blow which it dealt to the landowner's position as the leader in farming progress. The basic assumption of all the restrictive covenants was that the landlord knew best, and that he was only laying down the principles of good husbandry which his tenants must follow if the land were to be kept productive and in good heart. With half his capital melted away and his income proportionately reduced, both his interest in the land and his capacity to maintain his estates at the proper pitch of efficiency were impaired, and they have never been restored. Restrictive covenants, copied without amendment from lease to lease, became restrictive of good practice as well as of bad. Covenants by the landlord to repair and replace had often to be honoured in the breach, and thus the fulfilment of tenants' obligations could no longer be enforced. Old buildings became dilapidated, new buildings were postponed, the housing of the rural worker (always part of the landowner's responsibility) lapsed and it has never been generally reassumed.

Equally, hedging, ditching, and other works of maintenance and repair, covenants entered into on the tenants' part, were neglected.

Technically, as everyone knows, the farmer's only remedy for the collapse in corn prices was to throw land out of cultivation, reduce his labour force, and to develop pastoral farming where once corn-growing, turnips and hurdled sheep had flourished. The effect on rural industrial and social life was profound. Rural crafts and industries deteriorated with the decline of farming ; blacksmiths, wheelwrights, saddlers, hurdle-makers found their occupations gone ; and the millers, maltsters, and many of the smaller tradesmen, once serving large rural communities, found their services redundant. Something like three-quarters of a million men, women and children emigrated from the countryside to the New World, where agricultural workers were in great demand ; others found employment in the towns. In hundreds of village communities built up round a progressive agricultural industry in the previous decades, populations had fallen by as much as 50 per cent by the end of the century, and rural social and industrial life had received a setback from which it was not to recover until two world wars had restored the position of home food production.

One of the most interesting of the social changes of sixty years ago was a great migration of farmers. The depression had not affected the country uniformly. Thus it was that when falling corn prices put so many farmers out of business, it was in the midland, southern and eastern counties that big farms were going begging, while in the west of England, in Wales and in the west of Scotland, on the small grassland and livestock holdings largely independent of wage labour, farmers were hardly affected, and the demand for land (and even a certain land-hunger) remained. Soon it was discovered that in midland and eastern England farms both cheaper and bigger were to be had, and thus there began a great migration eastwards starting with the Scots, who moved into Essex, and followed by the Lancashire lads, Welshmen, the men of Devon, Cornwall and Somerset, who infiltrated all through the Midlands.* The men amongst whom they settled were striving to learn a new technique ; the migrants, on the other hand, had only to continue with their customary practice. This applied also to their way of life ; they were working farmers, recognizing no class distinctions which made it undignified for them or their families to work with their labourers in field and cowshed. The men they replaced had been " collar-and-tie " farmers, living more expansively and confining their work to the functions of management. " Devon farmers live close and never spend a bob," it was said. The Scottish farmers, too, were frugal and hard-working; the wife of one who had taken a derelict farm in Essex, rent-free for the first three years, remarked to her husband, " Eh, mon ! 'tis the first year that we ha' had no rent to pay, and the first that we ha' had money to pay a rent with."

In due course the great revolution was complete. Corn-growing, as the keystone of farming over half the country, had given place to livestock, and the stage was set for the great concentration on milk production, facilitated by the organization of milk collection on the farms by the great distributing firms. One effect of these fundamental economic and technical changes was to nullify the control and direction of farming practice by the landlord, and in 1906 legislation was introduced to free the tenant farmer from the handicaps of obsolete covenants. Instead of having to farm to a prescribed rotation of crops, he was to be free to crop his land as he liked, always

* See JOHN ORR, *Agriculture in Oxfordshire*, 1916 : E. LORRAIN-SMITH, *Go East for a Farm*, 1932.

provided that he kept it clean and in good heart and that he brought his ploughlands back into the rotation prescribed before quitting his holding. Further, if a tenancy were terminated for reasons other than bad farming or because the landlord wanted possession of the farm for his own occupation, the tenant was to receive compensation for the disturbance. Other changes, too, were made to the advantage of the tenant by the Agricultural Holdings Act of 1906, and the recognition by the State of the need to strengthen the position of the men who were doing the job and to encourage their efforts to re-establish English husbandry on a sound financial basis, first noticeable in 1883, now received a fresh impulse.

Self-help : Farmers and Farm Workers Thus stimulated, farmers now began to think of ways and means of self-help. In 1908 the first steps were taken for the formation of the National Farmers' Union. Magnificently organized from the start, and with effective membership confined to those actually engaged in husbandry, Colin Campbell and his friends quickly established their Union as the only body representative of the industry which could speak with one voice in the interests of farmers. With the outbreak of the First World War, its position as the spokesman of the combined farmers of the country was finally established, and it has never been questioned.

Farming was becoming yearly more and more commercialized, but experience had shown that the methods of the miner, the mechanic and other industrial workers for self-protection by combination, were not easily applied to farm labour. Joseph Arch's Agricultural Labourers' Union had perished, unable to survive the great lock-out of 1874, followed by the decline in the demand for farm labour during the years of depression. Although those who remained in the industry derived some benefit from the fall in food prices, they were still the lowest paid of any of Britain's wage-earners. Moreover, many of them were "day labourers" (even though in regular employment on the same holdings), and a wage of 2s. a day did not necessarily mean earnings of 12s. a week. Hours of work were not controlled, but ranged from 6 a.m. to 6 p.m. in summer and from daylight to dark in winter. Overtime work, either regularly by stockmen or seasonally on the land, were matters of bargaining ; Christmas Day was the only holiday with pay, though on some farms and estates a Good Friday holiday might be paid for after attendance at church. On the other hand, cottage rents were nominal; perquisites (payments in kind ranging from 30 stones of pork for bacon, down to a piece of ground for potatoes), though open to criticism, certainly had a stabilizing effect on the real cost of living.

In 1908 the State began to show an interest in the condition of the rural worker. At odd times since 1811, attempts had been made to provide land allotments of various kinds ; the smaller ones to enable him to supplement his own food supply—" to grow his own Poor Relief," as it was sometimes said—the larger ones to help him, perhaps, to set his foot on the agricultural ladder. But nothing really constructive was done until 1908, when the Government passed the Small Holdings and Allotments Act, which required the County Councils to provide land for smallholdings. A desultory interest in land settlement, boiling up at various times—for example, in connection with soldier settlements after the First War, and the relief of unemployment in the early 'thirties—continued, but it has never gripped the farm workers themselves, and has tended to become a sentimental rather than an economic issue.

1916-17—And After By 1914, a new equilibrium had been established on the land, following the immense development of overseas trade and a full generation of rural reconstruction. The value of the capital investment in the farming industry had been halved; one-third of the labour force had been withdrawn from the land ; leadership in agriculture and the countryside was passing from the landowner to the farmer. With the First World War, home food production again became important, but it was not until shipping losses in 1916-17 had reduced the nation's bread-food reserves to about six week's supply that legislative action was taken. The Corn Production Act of 1917 took many steps to promote production, the most important of which were a five-year guarantee of stable prices for wheat and oats for the farmer, and, as a corollary, the guarantee of minimum rates of wages for agricultural workers, with an Agricultural Wages Board constituted to fix them. Under a Food Production Department set up within the Board of Agriculture, and operating through County Agricultural Committees, the provision of adequate labour supplies, fertilizers and other requisites was assured. The conversion of so much grassland back to ploughland, and the great speed-up in the mechanization of manual labour which have been the basis of the great advances in the productivity of English farming during the last generation, may be said to date from the intervention by the State to direct and finance farming policy in the First World War.

As for the farm workers, the Agricultural Wages Board, set up in 1917, worked smoothly enough under the chairmanship, skilful and kindly, of Sir Ailwyn Fellowes, and with restraint and goodwill displayed alike by the employers, led by R. R. Robbins, and the workers, for whom the spokesmen were two experienced trade unionists, George Dallas and Walter Smith. Hours of work and minimum wage rates were fixed for all classes of labour, male and female, young and old, regular and casual. The greatest general achievement, probably, was the establishment of a weekly wage in place of daily pay.

The armistice at the end of 1918 found the rural community more flourishing than it had been for forty years. Only the landowners had been left out in the cold. Costs of farm and estate maintenance had rocketed, but rents as a whole had advanced but little. On the other hand, agricultural land had become a very marketable commodity, and capital values realizable on sale offered a ready-made solution to the financial problems of harassed owners. Thus more than 30 per cent of the agricultural land of the country changed hands during the next three years, most of it going to its occupiers.

The dozen years following the end of the war are a mournful record of the destruction of high hopes. The Agriculture Act of 1920, guaranteeing efficient home producers of wheat and oats against losses and continuing the regulation of agricultural wages, was repealed in the following year ; the country returned to the gold standard, and British agriculture shared to the full the economic depression which spread through the world, culminating about 1930. Only two bright spots illuminated the gloom over the countryside. The first was an Act passed in 1924 to restore the Agricultural Wages Board ; and the second, in the following year, an Act to subsidize the production of sugar made from home-grown beet. This introduced a new cash crop into the arable farmer's rotation, and valuable by-products for sheep and cattle food. Enacted as a measure to relieve the sore distress of the arable farmer, and given ten years to justify itself, this subsidy policy was continued further to encourage the farmer and eventually to ensure a minimum sugar supply to the nation at war.

Through the 1930s, the breach with Britain's free breakfast table policy widened, and by the time that a second World War had to be faced, the nation had turned to a policy of price support by one means or another for everything that the farmer was producing. Perhaps the most imaginative device was that which was embodied in the Wheat Act, 1932, conceived by a brilliant permanent official of the Ministry of Agriculture, the late Sir Arthur Street. By the simple expedient of putting a ceiling on the quantity of wheat to which the price guarantee should apply, the overplus had to go at world prices, and thus the price that the farmer got was reduced proportionately. In other words, farmers fixed the effective price of wheat by competing amongst themselves, the surest way by which to secure efficiency in farm management.

The organization of food production during the Second World War is too recent and too well known to call for description here.

New Vitality for Old Villages Social changes in the villages during the past sixty years have been indicated above. The great revival in farming and the prosperity of farmers has done little or nothing to repopulate the countryside, for the immense strides made in the application of machinery have obviated the need for more manual labour. Similarly, the development of mass production, the spread of the multiple shop, and the organization of rural transport, have militated against the return of the rural crafts, industries and trades of former days. How many children today have watched the sparks flying from the blacksmith's anvil, or have sniffed the pungent smell of burning hoof as the hot horseshoe is fixed? How many dressmakers, tailors and shoemakers are there today, such as every village could show when the Board of Agriculture issued the first number of its JOURNAL ? The 'bus takes everyone to the nearest town, where facilities for shopping and recreation are provided in variety such as their grandmothers and grandfathers never knew. In increasing numbers, however, these same facilities, combined with a love of the countryside, latent in so many, are drawing a new industrial population into village life, and there is ample evidence that with the further dispersal of industry, the old villages are showing a new vitality.

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RURAL LANDOWNERSHIP—YESTERDAY AND TODAY

THE EARL ST. ALDWYN
Williamstrip Park, Cirencester

THE landlord-tenant system is as traditional in our countryside as the hedges which wander across the landscape, dividing field from field, and farm from farm. And the one is as old as the other. For the landlord-tenant set-up in farming, as we know it today, dates back to the time of the enclosures, though there was, of course, a gradual evolution over the centuries. Under the Norman manorial system, the feudal lord had his own demesne cultivated by the villagers in lieu of payment of rent for the lands they tilled communally, and which supplied them with basic food and drink. As time went by this old system was modified, so that the villager commuted his labour for his lord by money rent. When labour became scarce and dear after the Black Death, the demesnes of the lords and the Church were let to a growing class of substantial tenant farmers. Here was the beginning of that very English character, the yeoman farmer, the predecessor of our owner-occupier, who has been the backbone of our farming for centuries. It was only later that the term "yeoman" became limited to a freeholder, owning and farming his land. These same yeomen were largely responsible for the earliest enclosures, towards the end of the fifteenth century. At this time quite a number of the open fields were fenced for the more profitable keeping of sheep, as wool prices were temptingly high and the home cloth trade booming.

The squirearchy, or landowning gentry, as opposed to the old feudal nobility, emerged as a distinct class after the dissolution of the monasteries, when large areas of agricultural land came on the market. The remains of feudal power were disappearing, but the landowner was the dominating force in the countryside—a person of wealth and influence. Our custom of leaving the family estates to the eldest son and pushing the others into the world to make their way in the Church, the professions or overseas, kept the estates intact. Their size and power were increased by the great enclosure movement of the eighteenth and nineteenth centuries.

This movement was not primarily, as some would have us believe, a seizure of the common lands by a rapacious, landowning aristocracy. It was the national response to the problem of feeding a growing industrial population before food was brought in on a vast scale from overseas. The old common land system had given a bare subsistence to a small population. Without scientific knowledge of fertilizers and rotations of crops, or adequate feedingstuffs for livestock through the winter months, the land was becoming played out and fresh meat a rarity for nearly half the year. As scientific knowledge was brought to bear on farming by those pioneering landlords whose names are now a household word, the rigid system of strip cultivation, and the common lands where animals were turned out together, gave way to the creation of individual, fenced holdings. These had to be provided with roads, ditches, drains and buildings, and here the landlord came into the picture as the provider of cheap credit for agriculture, the function he still fulfils. By 1830, 88 per cent of the farmers in England were tenants and, as Cobbett lamented, many of the yeomen, unable to bear the expense of equipping their farms, had been bought out.

Meanwhile, the third party in the industry, the agricultural worker, was going through a hard time. He had no capital to compete with the bidders

for land ; still less had he any to equip it for the new farming. The village industries which supplemented his income were swept away in the tide of the industrial revolution. And so he became a landless labourer on low wages, with little hope of rising in the social scale.

Taxation and Higher Costs So was the pattern woven of our triple landlord-tenant-worker system in agriculture. Sometimes one partner has been up and another down ; in the eighteenth and nineteenth centuries, landowning had its golden age. But now the landowner, beset with death duties and other economic burdens, may well sigh with envy at the farmer's security of tenure and the worker's minimum wage. For landowners still have their obligations of keeping up their property, while the wherewithal has been steadily whittled away—and not only by improvident ancestors ! True, the building of the mansion with its ornamental grounds, the world tour, the town house, the horses and hounds, and the gaming tables all made inroads into the family fortunes. But the Chancellor of the Exchequer's activities since the beginning of this century have been far more serious ! Landowners are constantly grumbling about that, though they say little about the lean years in farming following the flood of imported food, when so many cushioned their tenants, by writing off rent, against the worst consequences of national policy.

All that is by the way—a former moral, not a legal obligation, and not one that could be fulfilled to any appreciable extent in this second half of the twentieth century. As everybody connected with the industry knows, farm rents have nothing like kept pace with the rising costs of maintenance or the changed value of the pound. There is little left over to plough back in the form of improvements to fixed equipment, so urgently needed by the industry today. For in the past decade or two there has been a revolution in farming technique, coupled with an urgent need for labour-saving buildings, as wages have risen steadily and absorbed more of the farmer's income. Although there has been a gradual increase of average farm rents since the war, they have only just crept up to the level of the 1870s, when the £ was worth three times what it is today, repairs were cheap, and before income tax took a big slice out of the net rent.

The landowner can no longer look upon his ownership as a pleasant privilege or a hobby ; he has to think much more in terms of making his estate management at least pay its way. And that means putting up his rents to meet his outgoings, and perhaps taking land in hand so that he can make some profit by farming it himself and learn to understand his job. Nor should it be forgotten that he is so tightly tied by the security of tenure provisions of the Agricultural Holdings Act that he may not even be able to get hold of some of his land to farm himself. Thus has the wheel come full circle.

Careful Expenditure In spite of all these difficulties, the rural landlord carries on with his job, and has spent many millions of pounds on modernizing farm equipment since the war. He usually gets a very low return on his land—not more than about 1 per cent—and his provision of buildings, water supplies and so on, frees the tenant to use his own resources to stock the farm. The agricultural landowner must submit his capital expenditure to careful examination to make sure that the return he can get by way of increased rent for improvements justifies the outlay. Generally speaking nowadays, he has to borrow the money to finance big improvements. So the current rate of interest on long-term loans is a very

important factor in determining whether an improvement is economically worth while or not, both from his own point of view and the tenant's. On adjoining farms, identical improvements may call for different increases in rent, simply as a result of different borrowing rates at various times. When the rate was up to 6 per cent, borrowing very naturally fell off, and the provision of equipment suffered accordingly.

Another factor that influences the landlord's expenditure is the very long-term nature of his investment. While farmers think ahead for two, three, or perhaps five years, the landowner must envisage his new buildings lasting twenty-five years or more. Meanwhile, there may have been all sorts of changes in farming technique and practices. So the prudent landowner will try as far as possible to spend his money on improvements which suit not one individual, but a number of tenants, and which are readily adaptable to a variety of uses, whatever changes there may be in national agricultural policy. The provision of highly specialized equipment with a very short life must often be regarded as the tenant's responsibility. Examples of the type of expenditure in the former category are the multi-purpose covered yard, the good approach road, the concrete yard bottom. Nor will the good landlord begrudge expenditure on water supplies and electricity for the farm and buildings. These are not only labour-saving improvements, but make for good working conditions. Most important of all the landowners' obligations perhaps is the provision of comfortable cottages for the workers on the farm. With the co-operation of local authorities and the help of improvement grants, many sound old cottages can be brought up-to-date, with indoor sanitation, bathrooms, modern cookers, and other amenities. So even if a cottage is remote, the worker and his wife may be able to enjoy good housing standards. If there is no chance of a cottage getting on to the electricity mains, there is plenty of scope for the use of bottled gas for both heating and lighting with the most up-to-date appliances ; this is cheaper, and infinitely more convenient, than using paraffin. There is tremendous leeway to be made up in modernizing cottages since the agricultural depression, followed by shortages of labour and materials. This should now be a first priority for landowners, to help keep good workers on the land.

In planning improvements and maintaining them efficiently, there is no doubt that the big estate with its full-time agent and staff of skilled workmen scores heavily. As everybody knows, our present system of heavy taxation and death duties has led to the break-up of many of the great estates which formed self-contained units of this sort. Even people in favour of State ownership of the land have been heard to admit that it would be hard to improve upon the traditional efficiency of a well-run private estate. But the depletion of capital, combined in some cases with very low rents, has made it extremely difficult, if not impossible, to make them pay their way.

New Landlords Many farms have been sold to the sitting tenants, particularly since the last war, and this striking growth of owner-occupation is a healthy sign. But some farmers who previously rented their land have apparently bitten off rather more than they can chew. A few have been only too glad to shed the obligations of ownership and sell their land to corporations or farming companies, while remaining in occupation. A good deal of farmland is now owned by corporate bodies like colleges, which do not pay death duties, but the growth of big farming companies or syndicates is something rather new. If they have sufficient capital backing and fall in with sound landowning tradition, they will hasten the progress of modernizing our farm equipment.

And so we come back to our starting-point, the solid and well-proved worth of the landlord-tenant system in agriculture, which has stood the test of centuries. Much of its success is undoubtedly due to friendly personal relationships, which often span generations on both sides. In my view, the rural landowner still has a vital function to perform, in financing and supervising the fixed equipment of our farms, and passing on this land of ours in good heart to future generations.

FARM LABOUR SINCE 1894

ALDERMAN E. G. GOOCH, C.B.E., J.P., M.P.

VISITORS to the smaller, more remote villages of England are apt to remark that they are nearly exactly as they were half a century ago, changing hardly at all with the steady passing of time. They may be so in aspect, but changes so radical and so sweeping as to be rightly thought of as a complete revolution have taken place in the way of life of those whose turn it now is to live out their days in these haunts of ancient peace.

Modern country life is incomparably better than it was sixty years ago. We are thankful that those days are gone for ever. The period was one of the worst in the history of the farm worker. He then occupied the lowest rung upon the social ladder. In 1894 the wages of ordinary farm workers in my native county of Norfolk were 11s. per week, the average for the country being 12s. 8d. Horsemen, cowmen and shepherds used to get a shilling or two more. Hours were long – " all the hours God sends " was the countryman's picturesque description of them. Holidays were practically unknown.

Although it is true that money " went further " than it does today, no right thinking person would deny that those employed on the land were then shamefully underpaid. Imagine married life, with perhaps half a dozen young children, on 11s. a week ! The resulting conditions beggar description. The family would not have existed at all but for the supplementary earnings of the worker's wife, who was obliged to get a job at washing or charing, or in the field. Even then the family was denied all but the barest necessities of existence.

No pay was given when there was no work, and none when there was illness or accident. The farm worker had no insurance, no pension. If he was laid aside there was no escape from the dreaded appeal to the relieving officer. Throughout his life the worker was haunted by the fear of what would happen to him when he was too old to work, had no savings, and his children were too poor to keep him. The only vista that lay at the end of a life spent in following the plough was the vista of the hated poorhouse.

All this barely covers the facts of the case. How appalling was the condition of the labouring poor at that time may be gleaned from Government Blue Books of the period, and from contemporary writers. It would be wrong to assume that this condition of the workers arose from a special dose of original sin in the employers. Actually, it reflected the condition of the industry to which the worker belonged. Agriculture was then at the lowest point of a depression which started about 1874 and lasted until about 1896. There were disastrous losses, prices fell by about 40 per cent during

the period, and great tracts of land went out of cultivation. Among the causes were some exceptionally bad seasons, foreign competition, and national monetary policy.

In 1894 agriculture was the subject of an inquiry by a Royal Agricultural Commission set up towards the end of the previous year. During the whole period of the depression there was an enormous amount of investigation into the state of agriculture and its workers. Innumerable schemes were framed, and legislators made laws one after the other, with the object of relieving distress. But the legislation did not deal with the central problem—a price which would enable the farmer to conduct his business at a reasonable profit and to justly reward his workers. Agriculture was then buried under our economic system. Industrial supremacy was the keynote of our national policy, with a basis and support by agricultural helotage. The farm workers and farmers alike were the victims of economic forces they could not control. No effective steps were taken to prevent the wreckage of their enterprise. All that was done was to relieve the worst forms of their distress as a charity.

Social Advance Happily, the time has passed when the farm worker was regarded, not without reason, as beyond the pale. His lot is almost an ideal one when we compare it with that of his forbears working the same fields sixty years ago. Although wages do not offer unlimited scope for contention, we are so far ahead of those that went before us that a farm worker today can earn nearly twice as much in a day as his grandfather earned in a week. When all allowance is made for the change in money values, the farm worker is financially better off than he has ever been in the long history of agriculture. He has made great strides in this direction, and we are justified in assuming that he will continue to do so. His working conditions, too, have vastly improved. He has established his right to some leisure and normal hours are down to forty-seven. No longer is a holiday a rarity. Bank Holidays and an annual holiday with pay are now a feature of agricultural employment. Farm workers are not peculiar in thinking that they have not yet received all they have a right to expect—the feeling is common among all classes and groups—but they have reached heights which their unfortunate predecessors would have thought impossible.

Many factors have contributed to this marked improvement in rural life and work. Much of it is due to the adoption of the principle of self-help. In 1894 those national organizations which we now regard as an integral and indispensable part of our agricultural life had not come into existence. That the combination of the workers has been an agent of reform is generally admitted, and organization by the farmers for ensuring collective action in dealing with their problems has been similarly effective. There has been a remarkable growth in the strength and range of the activities of these organizations, and they have greatly increased the social and political influence of the farming community.

Social legislation, sometimes hastened by pressure exerted by the workers' organization and by its influence on public opinion, has also played an important part in changing the situation. There was a time when the farm worker was left out of social legislation, not merely denied rights, but denied rights given to other workers. Rural people the world over have been neglected in movements for economic and social reform. This fact need not be overstressed, for quite naturally the problems that arose out of the factory system and out of the crowding of the people into towns called for extraordinary activities designed to ameliorate economic and social conditions in those towns. The extension of the franchise to farm workers

in 1884, from which they were deliberately excluded in 1867, was an important event. The Old Age Pension Act of 1908 was a substantial improvement in the farm worker's lot. Small as was the first prescribed payment, it removed the stigma of unmerited pauperism and enabled the old folks to keep their self-esteem. It also helped sons and daughters to look after their aged parents. The Education Act, the National Insurance Acts, and the extension to farm workers of insurance against unemployment, have also helped to abolish the worst elements of the old feudal life.

Other developments have assisted the transformation of village life. In the old days the isolation of the village was extreme. The farm worker was almost tethered to his own patch of countryside, as the stock in the fields. Many workers lived within twelve miles of the sea and never even saw it. The coming of modern transport, the bicycle, the motor bus, the motor cycle and the motor car, have brought the farm worker into contact with the outer world. The radio and television have brought him into touch with the culture and enjoyments of his age. The wider contacts made possible by the experiences of the two world wars have given him a new horizon. All these external influences have helped to develop a new spirit in the countryman, to change his character, and give him a different view of life. Who would wish to go back to a former age? The English village is still far from being a paradise, but that its life is richer, more varied and better worth living than that of the English village of sixty years ago, cannot be seriously questioned. A great gulf lies between us and the rural England of 1894.

Influence of Mechanization But perhaps it is changes within the industry itself which have been most potent in improving country life, since the foundation of rural progress is agricultural prosperity. The promotion of research into farming problems, and the provision of machinery by which individual farmers are able to obtain technical assistance, has led to more efficient and cheaper production. There has been consolidation of land, better methods of land drainage, more scientific cropping, the application of chemicals to the soil, and improvement in the breeding of livestock.

Hand labour is no longer the main characteristic of the farm. There has been a great spread of tractors, combine harvesters, milking machines, barn machinery, and every sort of device to increase the value of the output of each pair of hands. It is the mechanization of agriculture, to which the two world wars gave a great impetus, which has been the greatest single factor influencing the changes of the last half-century on the farm, and which has had the greatest effect on labour conditions.

The resort to machinery and the organization of the industry in other ways means that a new type of worker must be produced—one who will need not less but more skill than formerly, although it will be of a different kind. No praise can be too high for the older generation of workers, whose technique and practice as farm workers was acquired as an art and craft by long experience, and who learned to use their tools and muscles to the fullest possible advantage. But the modern farm worker must be at least half engineer, and also in other respects a highly skilled man, able to appreciate and co-operate with scientific method. In recent times farm operations have become more intensive and very technical, and methods have been introduced which cannot be carried out with full efficiency without some understanding of the principles on which modern practice is founded.

There is no calling which more urgently demands trained minds—as well as hands—than farming today. And the farming of the future will make even higher demands on the experience and knowledge of workers on the land.

There is ground for hope in the flexibility and speed with which farm workers, especially those of the younger generation, have adapted themselves to modern techniques. Young farm workers have taken to machinery with rare appetite. They are happy in handling those implements of production which are more in keeping with the age in which they have been reared. They have also shown keenness and initiative in grasping any chance to acquire the knowledge and technical training essential to enable them to become really efficient in their work. It is a tribute to the mental force and ability of the agricultural workers that in spite of their limited opportunities so many of them have made themselves thoroughly acquainted with modern agricultural processes.

With the easing of the world food shortage, and the change in our agricultural policy from one set of conditions to another, the industry is now facing new problems. There are those who fear that agriculture will again go under the harrows. But surely all men of enlightenment and goodwill with the country's interest at heart are now agreed that a vigorous and flourishing agriculture is not a mere temporary need arising from the emergency of war, but a fundamental factor in a sound national policy.

Farmers and Farm Workers in Partnership Public opinion has travelled far in recent years, and in any difficulties which may lie ahead we must make an effort to enlist the interest and sympathy of the townsman. We must also aim at the greatest possible degree of unity within the industry. In this farm workers, who realize they have a community of interest with the employers in the prosperity of the industry, will play their part. Their aim is not merely to advance their own welfare, but also the welfare of the industry from which they derive their living, and the welfare of the country to which they are proud to belong. They are prepared to co-operate with the employers in any way possible to help improve the efficiency of the organization of the production and distribution of agricultural produce, and think they can make a useful contribution towards that end. There is a Joint Consultative Committee of Employers and Workers in agriculture on which a beginning has been made in exploring the possibilities of mutual help and co-operation in this direction, so that in the future farmers and farm workers may be partners in the prosperity of agriculture as well as honoured servants of the community. If this spirit is fostered and developed they will write a new chapter in the varied and exciting story of agriculture.

AGRICULTURE AND THE MAN IN THE STREET

TRISTRAM BERESFORD

THIS country has certain inherited prejudices about its food. Chief among them, and as English as boiled cabbage, is the idea that food should be cheap. Not just as cheap as trade margins can make it—there would be nothing characteristically English in that—but cheap in the sense that the staples of life are the last thing on which we should be expected to pay a price consistent with the costs of production and distribution. The notion of cheapness in relation to food has a meaning different from that applied in most other contexts to value for money. A motor car or a brand of soap flakes are regarded as cheap simply because they are competitive in the parenthesis of the home market. Our food is cheap only if it is available to us on the lowest terms negotiable in world trade. Our food is dear if home-grown costs are significantly higher than empire or foreign. The fact that many of the other things we buy may also be dear in relation to world markets does not concern us—or concerns us less. We may be aware, as consumers, that tariffs are imposed to keep the cheaper article out ; but when it comes to food, food is in a class on its own.

This is an idea that dies hard. It has had—almost without interruption—three generations of shopping basket experience behind it, and that is enough to establish a myth. The myth, as memory will have it, is that an Englishman's food always has been, and therefore always must be, at world bargain basement prices, regardless of the consequences to the producer, to the land, or to the continuity of supply.

New Concepts for Old In 1870, when Great Britain was the leading commercial power, doing a third of the world's business in industrial goods, it was inevitable that we enjoyed a buyer's market for food. It was then that the idea took hold. So long as the primary fuel of human beings remained cheap, wages could be kept low, and Britain could go on selling. Two generations later, when export markets had become more competitive, and our share in them had shrunk to a fifth or less, the idea still prevailed, although it did not occur to us at the time that our average standard of living between the wars improved at the cost of unemployment in many of our export industries. By buying food in the cheapest market, we impoverished not only our own producers, the farmers, but our customers overseas. If we had been prepared to pay a fair price for food, instead of a cut-throat price, it is at least possible that the financial slump of the 'thirties would not have been so severe.

The rest is recent history. We emerged from the last war as a second-rate industrial power, commanding a tenth or less of the world's market, and competing for that with the United States as well as with nations invigorated by defeat. We remain, as we have been for three generations, the largest importer of food, but our bargaining power has been weakened, and we have more mouths to feed.

It is primarily for this reason, though not for this reason only, that the productivity of the farms of this country is today a matter of direct interest to the man in the street. A nation that, for nearly a century, has been faithful to its agriculture only in times of war must now keep faith with it in times of peace. The traditional concept of "cheap" food must give way to the concept implicit in the Agriculture Act of 1947 of food as cheap as possible

compatible with a fair return to farmer and worker and with the maintenance of proper standards of husbandry.

The change in attitude towards prices for primary products is not, of course, confined to this country. It has been world-wide. All over the world, governments have been taking a hand in stabilizing agricultural markets, not because of the farmer's voting power, but because they are committed to policies of social welfare and full employment. A collapse in one sector of world trade leads inevitably to a collapse in others. For this reason, freedom in the mid-twentieth century is quite unrecognizable from freedom in the mid-nineteenth. A hundred years ago, society was concerned with prescribing the area in which freedom might not operate. Today, with great circumspection, we prescribe those areas in which she may. Freedom is a domesticated animal now.

The current policy of protecting home agriculture is realistic on other grounds also. The world today is crowded, hungry and unsettled. On a statistical basis, each member of the human family is entitled to an estate of only 15 acres, from which to feed, warm and clothe himself. But of those 15 acres, 5 are jungle, 6 are either desert or semi-arid and 2 are polar ice. From the point of view of food production, they can make no significant contribution to the world's larder. The residual estate is therefore 2 acres apiece, and it is shrinking perceptibly year by year, as world population grows.

The pressure of people on agricultural space is without doubt the paramount problem of our day ; it is at the root of world unrest. By comparison, the accumulation of plenty in the western hemisphere is a transient phenomenon, emphasizing the need not only to improve the machinery of distribution but to stimulate higher levels of consumption in hungry countries.

Nearer home, we have our own balance of payments problem. The more food we can economically produce in this island, the less we need to buy overseas. The increased output of our agriculture is already saving £400 million a year in foreign exchange. Even so, with output at its present level, over 10 million tons of shipping space are needed annually to supply the balance of our food requirements.

A Revitalized Agricultural Industry

So today, as for the last fifteen years, responsible opinion in this country, shaped by national necessity, has favoured what may come to be looked upon, in time, as an agricultural renaissance. For fifteen years, it has been not only the better land that has mattered; we have been compelled to secure production from all our available acres. Land, neglected in the recent past, has absorbed capital—both the farmer's and the taxpayer's—like blotting paper. And already, over the whole field of British agriculture, significant advances have been made. Current production is now 156 per cent of pre-war. Yields of cereals an acre are, overall, 40 per cent up, thanks to the plant breeder's skill and the farmer's improved husbandry. Yields of root crops, like potatoes, sugar beet and mangolds, are 30-40 per cent higher, and milk yields over a dairy cattle population of 3 million have risen by 100 gallons—that is by ¼ ton of milk a cow a year. We have doubled our pig population in four years, and now have more pigs in the country than ever before. Total cattle and sheep numbers, depressed in war-time by shortage of feedingstuffs, now, as a result of improving grassland management, have surpassed pre-war levels. The average farmer today is feeding nineteen families, where in 1939 he supported only twelve. Output a man is 30 per cent up, and higher productivity on 26 million acres devoted

to raising crops for livestock now enables three acres to do the work of four.

These achievements are the consequence of fifteen years of more or less consistent agricultural policy. The road ahead has been straight enough for the farmer to be reasonably sure of where he was going. He was paid to expand output, and he did so. The national interest called for quantity rather than quality, and everything he produced could be sold.

Now the emphasis has changed. Ration books have been torn up; there is a freer market in food, and quality counts for more than quantity. Within the limited context of the new freedom, the farmer must become salesman as well as producer. And already there is evidence that he will be equal to this task also. Through marketing boards, through commercial organizations like the Fatstock Marketing Corporation, and through other forms of co-operative enterprise, the agricultural industry is out to promote and to win respect for the quality of home-grown food. The objectives are two-fold : to meet the customer's choice, and to do so at the lowest possible cost to the taxpayer. Given time, freedom from unfair competition, and continuing public awareness that a thriving countryside is essential to the welfare and security of the whole community, there is no reason why both objectives should not be achieved.

POWER AT THE FARMER'S ELBOW

MAITLAND MACKIE, JNR.
Rothienorman, Aberdeenshire

IT would be quite a thrill if it were possible to take my grandfather around the countryside today. Sixty years ago he was one of the first to have the new self-binder, which replaced the old side- and back-delivery reaper. He used to recount how during harvest-time one day a neighbour hailed him as he was passing in his gig and asked if he would tell him what was wrong with his own new binder which had stuck for some unaccountable reason. My grandfather, like the great majority of his generation quite unmechanically-minded, could find nothing wrong and in exasperation gave the binder a mighty kick, saying he could be of no help. With this, a little stone, which had been jamming the chain, fell out and the repair was complete! Today we may often have the same exasperation, but usually the cure is a little more complicated and expensive!

The invention of the binder and its general adoption was probably the biggest advance in the mechanizing of our farms until horse and water power gave way to the oil engine at the beginning of the present century. At this time farming depended on three sources of power to assist the over-worked but very willing manpower—the horse or the ox, wind and water. Even I can remember, only thirty years ago in this district, an ox and a horse yoked together for ploughing; thirty years before that it was a common sight. Horses have now virtually been completely replaced by the tractor, the small engine and electricity. When water was the main source of power on many farms, there were few with such a supply of water that threshing could be carried on for more than one or two hours at a time. With the introduction of the smaller type of oil engine suitable for farm work, threshing

became much simpler and could be done for a whole day if necessary; more usually, however, it was a job for a few hours in the afternoon, until the cattlemen had to attend to their stock at four o'clock. Although the engine provided a reserve of power on the farm, it was seldom used except to grind or bruise oats for cattle feed. In very few cases was it used to produce electricity, until twenty years later the introduction of the smaller engine and the national grid made it more economical.

In the Fields About the beginning of the 1914-18 war the tractor began to make its appearance, but in spite of the high price of horses and the scarcity of labour, it made little headway, except in very favourable circumstances. Both farmers and farm workers were married to the traditional methods of farming, and it may be that on many occasions the early tractors did not get a really fair trial. I remember our grieve at home telling my father with great delight that he had now found a use for the tractor—to pull the heads of the corn stacks straight by means of a rope attached to a ladder laid up and down the offending stack! But by the late 1930s the tractor had unquestionably won its place. The iron-wheeled tractor had its limitations, but with the introduction of low pressure rubber wheels the fate of the horse as the chief power unit on the farm was sealed. With rubber wheels, the mechanizing of our farm took an enormous leap forward. Who, today, would like to think of farming without them?

Apart from the introduction of the binder and the tractor, the greater part of the development of power on the farm has taken place in the last twenty years. I suppose one of the main reasons for the slowness to mechanize after the First World War was the state of the farming industry. The business was not profitable and wages were ridiculously low for long hours. Even had the machines been available, it was cheaper to employ labour at 6d. an hour—and labour was available. With no demand for machines, there was no real incentive to engineering firms to design and manufacture special implements for farmers. As profits began to be made, so wages rose, and with the start of the Second World War the whole position was reversed. The home production of food was vital, labour was scarce and dear, so the real urge to mechanize began. As soon as manufacturers could see an expanding market, there was no end to their ingenuity in supplying the wants of the farmer.

The tractor is, of course, the main power source on the farm, but to begin with it was used not too successfully to pull old horse implements or tractor implements, which were only modified horse tools. For instance, to start with it was said that tractor ploughing allowed the land to get weedy, but as soon as ploughs were made to take a wider furrow with a short board to really turn the ground over and break it up a bit, the difficulty was gone, and this development has lead to much cleaner farming than with the old long-board horse ploughs. Probably the greatest single advance in tractor design after the rubber tyre has been the power lift, with implements designed to suit the new three-point linkage. For the small farm (and the bulk of our farms are small) the new range of implements designed for the power lift has made complete mechanization not only possible but economical; it is a really great advance over the old rather clumsy trailing implements. To bring the tractor picture up to date, but not we hope to complete it, there is now a great fuel change-over in progress from paraffin to diesel oil. It is not unlikely that in a few years only diesel tractors will be on the market.

Before the national grid supplying electric power to farms really got under way, there was a tremendous development in the use of the small h.p. petrol and diesel engine for the lightening of many jobs on the farm, and we are still using them. They drive water pumps, potato riddles, milking machines, elevators for bags, bales, corn, hay, straw, muck, etc., and in a hundred ways take the sweat out of these jobs instead of out of the man. Even today brute strength is not a bad thing to have on a farm, but there is no doubt that in the past we had to rely on it. The obvious instance was the handling of millions of tons of muck every year. From byre to midden or court, from court to cart, from cart to heaps in the field, and then from heaps to be scattered by hand over the land. What an enormous amount of labour is now saved, either with the new tractor-mounted, hydraulic-lifting forks, or the elevator, and the spreading machines either from the cart or heap. My father had a grieve who, before we had any of these machines, by himself filled 96 cart-loads of about 15 cwt. of muck direct from the midden in a 9½-hour day. That was one load every 6 minutes! We have few men willing, or even able, to do such a thing today—or perhaps we have more sense.

As I said at the beginning, the development of power on the farm has been a revolution in farming, and nowhere is this more complete than in the harvest field. The combine harvester introduced from abroad, and thought only suitable for large areas in a dry climate, has now come to stay. No farmer that I know of who has changed over from binder to combine has ever gone back; but it has brought other problems with it. In its wake are coming new grain driers and storage sheds, all a natural and necessary development. It seems we cannot stop even if we wanted to, for one thing leads to another.

In the Buildings With the mechanizing of the outside work well on its way, attention was turned to the work that went on in the farm steadings and houses. Here the lack of an electricity supply was the real limiting factor, but much has been done over the past twenty years to overtake this need. The first and obvious change was merely to illuminate the houses and steadings properly, instead of with the old-fashioned lantern. What a godsend such light was in a milking byre at four o'clock on a cold morning! I am glad to say that, in the main, this boon has been shared with the workers, so that few can echo the bitter reply of the cattleman who when asked what his first jobs were in the morning, replied: "To blow out the paraffin lamp in my own house and go over and switch on the fluorescent light in the cowshed."

But light was only one thing. We could now replace the rather temperamental little engine with the small electric motor, which is so much more convenient for a host of jobs. The provision, for instance, of an adequate water supply is greatly simplified by the electric motor, time-switch and small water pump. Again, what an advance from the old hand pump, or even the exasperating windmill which was quite common in many areas. Now, at the touch of a button, we can slice turnips, grind grain, drive elevators, sawmills, food mixers, clipping machines, and so on.

Until recently, little thought had been given to the application of power to the management of stock. But now we milk our cows by machine, we use electric fences to contain them, even an electric wire to make them stand up in their stalls, and an electric clipper to remove their hair. We use bulldozers to clean out the byres and overhead runways for feeding. Even the barrow, which has withstood change for fifty years, is now more often

a four-wheeled bogie, and the latest models are self-propelled by electric battery. In the pig-house the pig is prodded round the pens with a stick which gives an electric shock, and the problem of dung disposal from pig-houses has been solved with a sludge pump and a tank spreading direct to the field. Nor has the hen been forgotten. She is now housed in three-to-six-tier batteries and fed and watered automatically from electrically-driven troughs in real cafeteria style. Even the age-old picture of the shepherd tramping over the hills with crook and dogs is fading, for on many hills you can see the jeep or car going the rounds. And not only on the hills; on the bigger arable farms, too, a small truck of some kind is considered essential for the quick transport of men or materials.

Labour has not only left the land; it has also left the farmhouse, and nowadays power is essential for the farmer's wife. She must have, and is rapidly getting, electric cleaners, refrigerators, cake mixers, floor polishers, washing-machines—all the things that once looked like luxuries but are fast becoming essential if life is not to be too much of a daily drudge.

The New Outlook The whole application of power to the farm has had an effect on the type of worker needed on the land. We must have brain and technical ability now, as well as a bit of brawn. Gone are the days when the man scoffed at or looked with suspicion on every new machine. I remember being sent, as a small boy, to offer the loan of a hay fork to a neighbouring grieve to help with his big crop of hay. His rather ungracious reply was "Tell your father I've put up the hay for forty years without one and I'll manage now without one." Full mechanization has increased enormously the capital employed per acre, but with it has come an equally great increase in the production per acre, although perhaps, not such an increase per man. But then it is only right that the machine should be used to save the man, otherwise we should be in danger of becoming the slave instead of master of the machine. Even with shorter hours, holidays and the reputed lower standards of work, production per acre and per man is well up over the last twenty-five years. Here are the figures for a dairy farm in Aberdeenshire producing milk and oats. In 1927 production per acre was £10, and in 1954 it was £55. Even if money values are 3½ times greater today, £55 compares well with £35. In 1927 there were 8 men against 9 now, so that production is up both per man and per acre. Power has paid both farmer and country.

Looking on the changes of the last sixty years, and especially at the rate of development over the last twenty, one wonders what stage we shall have reached in the next sixty. The new science of electronics has hardly touched the farming industry yet, and we have atomic power round the corner. Yes, I think it would be quite a thrill if my grandfather could come back and have a look at this modern age of farming. Although the best manure of the farmer's foot has been replaced by the wheels of the jeep, I should be quite proud to drive him around.

Land Enduring

S. R. O'Hanlon, Editor, "Agriculture"

MAN is more than the sum of his parts : so, too, is farming something more than a prosaic means of livelihood. That is not to accept the aura of false romanticism which has enshrouded the life and work of the countryside until very recent years, but rather to acknowledge the abiding truth that those who work in a partnership with nature have a reward which cannot be enclosed within the pay packet or paid into a banking account. Often enough, there may be no manifest consciousness of it, but the instinct is there nevertheless and, as rural history shows, in times of hardship and uncertainty it has not seldom been the deciding factor in keeping a man and his family on the land.

The depression that gloomed over agriculture in Britain when this JOURNAL *was started in* 1894 *lifted momentarily only once until the farming renaissance which had its birth in the dire days of the* 1940*s. Today all the emphasis (and rightly so) is on the efficiency of our agricultural industry—the basis on which continued prosperity alone can be built. New ideas, new skills and new methods have replaced the old. Scientific research is continually opening up new possibilities, and the modern farmer is not slow to take advantage of them. But underlying all is the same doctrine of good husbandry to which innumerable generations of farmers have subscribed—the land first, themselves second.*

We have come a long way since the mattock and the primitive ox plough stirred the first piece of virgin valley soil. Here was an initial use of capital that has been renewed again and again throughout the centuries. What other industry can claim as much ? What other industry can point to such adaptability in the use of its capital and organization as that which has been demonstrated in agriculture ?

And out of all this, each generation building upon the labour and resource of those which have gone before, has evolved the kindly English countryside that we know today, replete with a unique beauty yet in no way dissociated from an essential practical utility. It may be the great rolling contours of the downland which suggested to Chesterton the allied smoothness and strength of great carthorses, while above them " like great gods, the stately clouds go by." It may be a Dales farm, small and sequestered, enfolded by the brave heights of the Pennines, and bordered by trout streams and upland heath and heather. Or we can look, as Cobbett did, early one morning more than a hundred years ago, across the rich fields, meadows, orchards and villages of the Avon Valley, and feel the same delight in its beauty that inspired his praise. The detail of the scene is different. There are fewer men and more machines ; tractors have usurped the teamsmen's pride ; the flashing scythes and sickles of reapers moving rhythmically in echelon across the cornfield have been replaced by the all-devouring combine ; aisled stooks less frequently pattern the fields ; cattle graze in a thin line along the electric fence. These and other changes in the older order endorse the present need.

It has been our intention in this issue to present within the limits of the art section a miniature portrait of the English countryside—the backcloth, as it were, to our farming skill. This lovely land, farmed in faith and nurtured in affection, has endured to evoke countless pieces of nostalgic prose and verse, as when Rupert Brooke, writing from the Continent, asked :

And laughs the immortal river still
Under the mill, under the mill ?
Say, is there beauty yet to find ?
And Certainty ? and Quiet kind ?
Deep meadows yet, for to forget
The lies, the truth, the pain ? . . . oh ! yet
Stands the Church clock at ten-to-three ?
And is there honey yet for tea ?

Sussex Downs, above Shoreham. "Bare slopes where chasing shadows skim," and beyond "the blue goodness of the Weald."

Wensleydale, Yorkshire

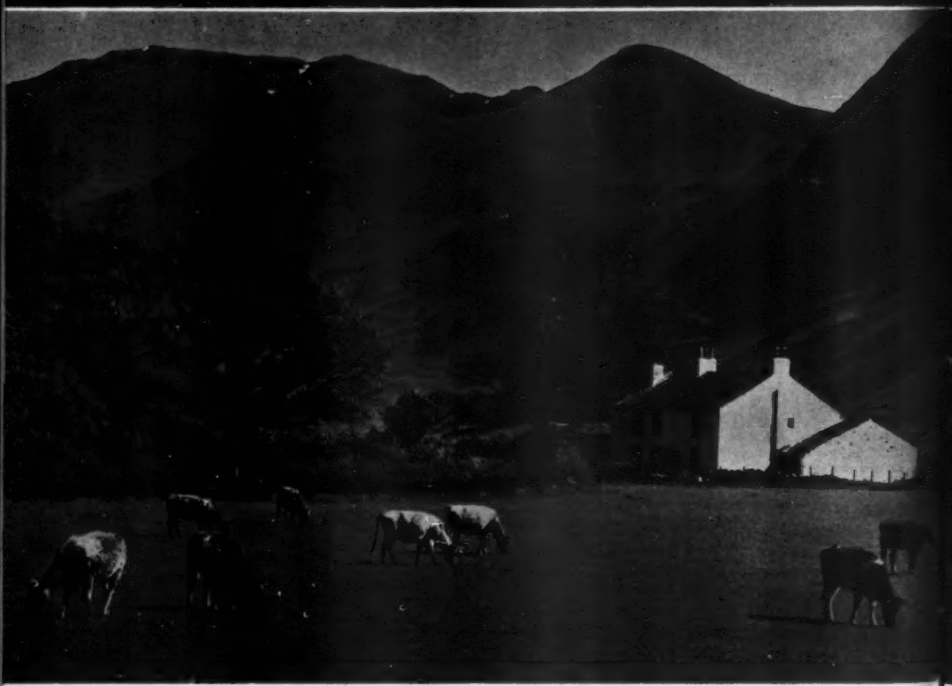
There *must* be dales in Paradise,
Where Wharfe and Aire and Swale
Fulfil their several destinies
And tell their various tale.

Gloucestershire, Source of the Windrush. Here the emphasis is on corn and grass (three-year leys) typical of the Cotswold system. Beef stores on multiple suckling and breeding flocks of grass ewes, mainly Clun and Kerry, are well to the fore. A very large area of Brussels sprouts is also grown.

Coryton, Devon, on the west side of Dartmoor. This area is predominantly grass, with some forage crops. South Devons are popular for dairying and store raising, and Dartmoors and Devon Longwools are the favoured breeds of sheep for breeding flocks and store production.

Dovedale, on the borders of Derbyshire and Staffordshire. Thin soil, with rock close to the surface, the area is mainly grassland for dairying, stock rearing and sheep. Once a celebrated area for Shires, a few men are still breeding and rearing foals. Good trout and grayling abound in the River Dove, as Izaac Walton and Charles Cotton testified.

Valley of the Coquet, Northumberland. Good mixed farming land outside Rothbury, devoted to retail dairying, forage crops, and the rearing and feeding of Aberdeen-Angus × Shorthorns and Half-bred ewes. The Simonside Hills in the background are at the south-east end of the Cheviots.



Summertime on Bredon. The view from Bredon Hill (Worcs) looking across the Gloucestershire part of the Vale of Evesham to the Cotswolds. Washbourne Hill is in the middle distance.

Loweswater, Cumberland. Lowland pastures and meadows are heavily grazed often till late in May, before the open fell is available. Some milk is produced, but stock rearing—dairy and beef stores, sheep and lambs—is the main concern. A small arable acreage supplies crops for stockfeed.

Bakewell, Derbyshire. "Badequalle" in the Domesday Survey, this typical English market town is situated in the beautiful wooded country of the Wye valley, in the centre of a great stock-rearing area. Bakewell has several major cattle fairs annually, and its yearly agricultural show is justly famous throughout the country.

Craven Arms Market, Shropshire. The S.E. corner of Shropshire and adjoining parts of Wales comprise one of the most important sheep-rearing areas in Britain. For nearly a century its ready accessibility has made Craven Arms a point of concentration for stock dispersal to buyers from all over the country. From August to October the market handles upwards of 50,000 ewes, besides some 15–20,000 store sheep and 25,000 fat lambs and tegs a year.

Lincolnshire. Tulips. Although a comparatively new industry, upwards of 3,000 acres of tulips and daffodils are grown. The production of bulbs for the home and export markets, together with the forced flower trade (approximately 3,000,000 sq. ft. under glass), employs much labour and brings £1,500,000 into the county annually.

South Lincolnshire. Potatoes. The principal crop, of which some 50,000 acres are grown annually. The rich silt soils produce heavy yields and tubers of the highest quality. From the planting of sprouted seed to lifting, harvesting and dressing for market, the crop is handled by both male and female labour, and gangs such as this are an everyday sight throughout the season.

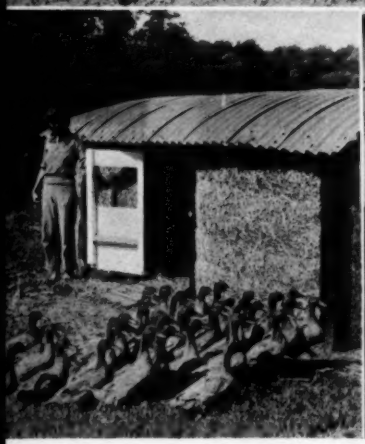
Monnow Valley looking towards the Graig Hill. For most of its picturesque course, the River Monnow forms the boundary of Monmouthshire and Herefordshire. This is mainly pastoral country, where Herefords and Marches sheep flourish.

Horseshoe Pass, Llangollen, the bracken and heather bordered gateway to N. Wales, climbing steadily from 400 to 1,300 feet in about two miles, with a steep precipice all the way. Small mixed farms occupy the lower slopes, and on the Pass itself Welsh mountain sheep graze heather, nardus and fescues.

Brecon Beacons dividing rural Breconshire and industrial Glamorgan. Common grazings abound, the grassy hills running up to 2,900 feet. From this store area thousands of draft hill ewes are sold annually.

Meifod Valley, Montgomeryshire, from Pentrebeirdd. A well-farmed productive area through which flows the River Vyrnwy. Milk production is the main enterprise, with some breeding, rearing and feeding of Hereford cattle and Kerry sheep.

Coed y Brenin (The King's Forest), Merioneth, named in 1935 in commemoration of the Silver Jubilee of King George V. This, one of the largest State forests in Wales, and thought by many to be the most beautiful in Britain, covers 16,841 acres. Douglas fir, Norway spruce (familiar as the Christmas tree), Sitka spruce, and Japanese larch predominate.



Student Farmers. Common Room, Wye College; Glasshouse work at the Waterperry Horticultural School for women, Wheatley, Oxfordshire; Tractor instruction at the Kent Horticultural Institute, Swanley; Work in the conservatory, Wye College; Poultry section at the Institute of Agriculture and Horticulture, Usk, Mon; and learning the skill of hand-milking.

Lea Valley (Essex and Hertfordshire), close to the north-east of London, where 1,200 acres of glasshouses are intensively cropped mainly with tomatoes, cucumbers and flowers for markets in London, the Midlands and the North. Tomatoes cropping at 70 tons an acre, and cucumbers 100 tons an acre, are not uncommon.

Marazion, Cornwall. About 2,000 acres of bulb flowers, mainly daffodils, are grown on the light, warm soils of Cornwall. Small fields, surrounded by hedges, protect the flowers from wind damage. The daffodils are normally gathered when the buds are breaking, rather than at the advanced stage shown here.

HORTICULTURE IN THE HALF-CENTURY

F. A. SECRETT, C.B.E., F.L.S., V.M.H.
Milford, Godalming, Surrey

AT the beginning of this century many of our market gardens were within a few miles of Covent Garden, mainly at Fulham, Chiswick, Brentford and Ealing. But owing to urban and industrial development, many growers had to go further afield, especially in the Home Counties. Distribution was entirely dependent on railways or on horse-drawn vehicles. The horse population in the towns was very high, and horse manure was in such plentiful supply that in many cases growers were paid to keep the stables clear; army horses and polo ponies also made their contribution.

Labour was also abundant, and the hours long—from six in the morning until six at night, with one-hour breaks for meals; work ceased at five o'clock on Saturdays. The wages for male workers was £1 a week, with the opportunity of piece-work, when 30s. might be earned. Women were paid 12s. 4d. per week, and they also increased their earnings by piece-work. Unemployment was rife and there was much poverty amongst the working classes everywhere.

All the cultivations were carried out by horses, with the exception of certain areas which were hand-trenched every year for such crops as onions and cauliflowers. During the winter months it was common to see gangs of Irishmen bastard-trenching quite large areas of land. Owing to the plentiful supply of animal manure, soil fertility was assured, much of the manure was turned by hand before being applied to the land, thus destroying the weeds. Dressings up to 50-60 tons per acre were applied annually, and it was rare to see fields infested either with perennial or annual weeds. The standard of hygiene on all well-run market gardens was high. There was little need for insecticides and fungicides, for disease was largely controlled by the skill of the husbandman, chiefly by good cultivations and the maintenance of soil fertility. Top dressings as stimulants were unnecessary and practically unknown.

In those days there was very little competition from Continental growers. The areas devoted to glasshouse and vegetable and fruit production were much less than they are today, yet, as now, climate largely controlled the quantity, quality and the price of produce. In years of plenty crops would be ploughed in; in years of shortage high prices would be obtained, very often for an inferior article. The average price for lettuce was 1s.–1s. 6d. per crate of two dozen; radishes 9d.–1s. per dozen bunches; rhubarb 2s.–2s. 6d. for one dozen 3 lb. bunches; spring greens, 1s. 6d. per bushel; cabbage 1s. per dozen ; tomatoes 2s. to 4s. per doz. lb.

During this period there was no growers' national organisation. Later on the Federation of British Growers was formed, but this organization was supported chiefly by glasshouse and fruit growers, and it was not until they were taken under the wing of the National Farmers' Union that any national effort was made to organize and develop the industry.

The years 1910-11 saw a decided improvement in trade, and the industry enjoyed a period of prosperity which continued until 1921. It is unfortunate that horticulture is always most prosperous during periods of national

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Kent. Apples and Hops.

emergency. At that time we were still largely dependent upon horses for cultivations and transport, and it was not until 1919 that tractors and motor lorries became available. Their use brought many changes in the industry, for in the past much ground had to remain empty during the summer months because the farm horses were employed upon haulage. The internal combustion engine on the farm has been responsible for doubling our yearly output.

Foreign Competition During the 1920s the industry suffered severely from foreign competition, especially in out-of-season crops. As a result, many English growers turned their attention to the production of intensive crops under French and Dutch lights, largely copying Continental methods. Lights had previously been used in this country, but mainly to protect plants during the winter months for planting out in early spring. Dutch and French lights took the place of the old English heavy light, and I think I was the first grower to import Dutch lights from Holland. These lights were used, not only for the production of plants, but also for finishing the crop. There was also a great development in the use of cloches, especially by small growers, as a means of bringing forward and protecting crops.

In the West Country the broccoli industry was severely hit by the well-graded foreign produce from France and Italy. This competition applied to much of our English produce, for an exporting country sends only her top grade. It became very evident to progressive growers that better grading and packing was essential. This movement was fostered by the Ministry of Agriculture in their National Mark Schemes. In the West new strains of Roscoff broccoli were obtained from France, and the old Cornish strains ceased to be used. The large Cornish hampers, containing nearly 1 cwt. of ungraded and untrimmed broccoli, disappeared from the market, and the rigid wooden crate, like that used by the French, replaced it. The first large commercial Horticultural Show ever held in this country took place at Penzance, and within a few years the best growers in Devon and Cornwall were producing crates of broccoli equal to anything coming from abroad. The acreage of bulbs and anemones increased, and Cornwall started to reap a large revenue from her horticultural produce.

During the First World War, narcissus bulbs all over the world were attacked by a new disease thought to be a form of fusarium or basal rot. The disease was not only rampant in Lincolnshire and Cornwall, but also in Holland, and after investigations it was found that the trouble was caused by Narcissus eelworm. A young scientist, the late Jim Ramsbottom, started his investigations on this disease at the Royal Horticultural Society at Wisley. When working on this problem in the laboratory at Wisley late one night, having taken no food all day, a hot dinner was brought to him by the caretaker. To his annoyance, Jim Ramsbottom dropped the slide containing the eelworm into the hot gravy tureen. When he had finished his dinner he removed the slide and noticed that the eelworm were dead. He immediately consulted the Director, Mr. Chittenden, who, with his mature knowledge, advised Ramsbottom to follow a line of experiments to ascertain the heat necessary to kill the eelworm, and what heat the bulb could be subjected to without harmful results. He continued his research in the Spalding area, and within a few years the hot-water treatment of bulbs became a routine procedure before planting.

But to leave Cornwall, in the late 'twenties a few growers got together and staged at the Royal Horticultural Society's Hall in Vincent Square an

exhibit of early market produce to demonstrate to the public the quantity and quality of English grown. Later on a small Committee was set up which made itself responsible for the Early Market Produce Show; this was held annually in April at Vincent Square. Pamphlets were prepared, and lectures on the correct methods of producing these early vegetables were given up and down the country. Within a few years the old Hall was packed to overflowing with high-grade examples of home-grown produce. But the English grower was still being undercut by the subsidized foreign produce, and it was not until the early 'thirties that the Government imposed an import tariff on some produce and the Import Duties Advisory Committee was set up to advise on this matter.

These duties had a psychological effect on the industry. Grading, packing and presentation were improved, much being done under the National Mark, and clean non-returnable boxes replaced the dirty returnables. While prices did not rise against the housewife, gluts brought about by foreign competition were eliminated. Home markets became more stabilized, profits were reinvested in the farms, more glasshouses were erected, and the use of Dutch lights and cloches increased. Much high quality produce was now supplied from our own farms.

Just as the industry was again getting into its stride, the 1939 war broke out, and in the light of experience gained in the First World War the whole of the horticultural industry had to be strictly controlled.

Since the War Since the war the horticultural industry has again passed through difficult times, by reason both of foreign competition and by gluts created at home. The great increase in the national acreage of horticultural crops necessary during the war had to be greatly reduced when more variety was again available in our shops, and the cutting down of this acreage has been a slow process. The slip-shod war-time methods of grading and packing had to be forgotten, and a return made to better presentation. Again, this improvement has been stimulated by the N.F.U. Market Produce Show Society, which was started at Southampton; this show is now under the aegis of the Royal Agricultural Society.

Perhaps one of the greatest problems facing the production side of the industry today is the general shortage both of skilled workers and emergency labour for harvesting. The scientist, engineer and the implement manufacturers have certainly helped us—the scientist by his work on weed and pest control, the engineer and manufacturer in the development of labour-saving machines, but the actual harvesting of our crops can never be mechanized. Scientific research has solved many of our problems, yet in doing so it has created many others. By the increasing use of machines and lack of attention to humus, we may be in danger of upsetting the balance of nature, and if so we can expect that she will hit back—with interest. The installation of irrigation plants during the last few years has greatly increased in an endeavour to help offset these dangers. The readjustment of tariffs recently made has been a very useful contribution, the work of our National Research Stations and Experimental Farms, the work of the N.A.A.S.—all have been of great value in assisting to modernize our market gardens, yet the time is far distant when every man will sit under his own vine and under his own fig tree and none will make him afraid.

Perhaps the one outstanding need today in the light of recent scientific development is for the extension of education in the actual *practice* of horticulture, for honours degrees are not all that are needed to make a good husbandman.

WELSH AGRICULTURE IN TRANSITION

J. MORGAN JONES, C.B.E.
Welsh Secretary, Aberystwyth

WHEN the first issue of the Ministry's JOURNAL appeared in 1894, farming in Wales was about to embark on a period of relative stability, affording profits which, though modest, had a high purchasing power due to the low level of living costs and of taxation. The golden days of the mid-century, when high farming carried large rural populations, were over and the industry had adjusted itself to the first wave of competition from the New World. The typical Welsh farmer was mainly engaged in the production of store cattle—with butter as an important secondary product—and of sheep, together with a few pigs and some poultry of the barn-door type. Essentially, the system was the same in the lowlands, except that here the farm income was partly derived from fat animals, including pigs, and the sale of cereals. Compared with modern standards, farm turnover and costs were low and the range of the farmer's technical and business knowledge was narrow. Yet the level of husbandry around the turn of the century was generally good. A large labour force accustomed to long hours of work enabled the farmer, especially when he had a good landlord, to concentrate on his land and livestock. Thus the hills were well stocked with cattle ; sheep-walks carried a resident shepherd, and the quality of hill grazing was maintained by the considerable effort devoted to the harvesting of bog hay and to the cutting of bracken. Substantial areas of root crops and the heavy use of lime were features of good husbandry on the better land.

Impoverishment of the 'Twenties The deep-seated change set in motion by the First World War did not leave its visible marks on the agriculture of Wales for some time. Of course, Wales had played its full part in the ploughing campaign in which a few tractors had made a short-lived appearance ; the Welsh farmer had experienced the impact of national and international affairs on his business activity : but the rural scene in the middle 'twenties was not markedly different—at least to the casual observer—from that of twenty years earlier. Apart from a growing interest in milk production, the industry clung to traditional policies of production and, more or less, to traditional methods. By turning over to permanent grass and taking advantage of cheap feedingstuffs, the majority of farmers were able to make tolerable incomes. But as the decade advanced the number of estate owners declined and there was a distinct tendency for property owners to avoid meeting any expenditure that could be postponed. Drains, ditches and fixed equipment began to show signs of neglect. With the reduction of cattle and wether sheep, bracken gained control of more and more of the uplands : trees on the horizon showed where the sheep farmers had given up the struggle.

The crisis came in 1929 and the opening years of the 'thirties. Shipping losses had been made good and refrigeration technique perfected : food production in exporting countries had more than recovered from war-time disturbances and had outstripped a demand weakened by widespread industrial depression. Britain became the unloading point of cheap food. The level of returns in the industry was so low that farmers were, with justice, demanding the limitation of imports and were themselves forced to change production policies and to organize the marketing of their products. These factors culminated, around 1933, in the Ottawa Agreements,

the Marketing Acts and, what proved of immense importance to Wales, the establishment of the Milk Marketing Board. From that point, agriculture in Wales took on more and more of those aspects which characterize it today : the international situation, economic necessity and technical developments in all directions set the stage for changes which in twenty years were completely to transform the Welsh countryside.

Restored Confidence The general recovery, after 1933, of agricultural prices, with improving returns from cereals and fat cattle, served to restore confidence generally and, with measures such as the Wheat Act and the Land Fertility Scheme, gave a new impetus to arable cultivation and grassland improvement. Rising employment in industry and a greater mobility of labour—accelerated by the cheap motor bike and the 'bus—helped to force up farm wages, with the result that there was a growing demand for the machinery which engineering skill had adapted for agricultural use. But from a Welsh point of view the most important single factor was the high relative profitability of milk ; not only was the price attractive, but farmers, having been brought to a low ebb by low and uncertain prices for store stock, quickly gained confidence in their Marketing Board and welcomed the security derived from regular monthly payments at rates known in advance. Growing numbers of farmers took up what to them was the entirely new enterprise of liquid milk production : it was fortunate for them—as indeed for the industry as a whole—that in the inter-war years successive Governments had financed extensive advisory services and that the Research Institutes, especially the Welsh Plant Breeding Station, had paved the way for rapid technical development. Indeed agriculture in Wales was far better equipped to take the strain of a Second World War than could have been hoped for six years previously. Some measure of how it met the challenge can be made from the table on p. 288, which also covers other relevant points.

Succour to the Hill and Upland Farmers A condensed table such as this one masks significant differences between one part of Wales and another : although the products, such as milk and fatstock, which one expects from lowland farming, are to be found in most parts of the Principality, much hill and upland is inherently suitable for store stock production only. This class of farmer did not share in the better fortune which his brother in the valley enjoyed in the years immediately before the Second World War: there was a lag in the adjustment of store cattle prices to improved returns for fat cattle, while the prices of fat—and consequently of store—sheep and wool remained at a relatively low level until 1940 at least. His type of life, where a high level of management depended on ample labour, had in fact never really recovered after the 1914-18 war ; in the intervening years many of his neighbours, on whom he relied for co-operative help, had migrated to the lowlands. The vagaries of the Second World War increased rather than eased his problems. The better land was ploughed for cereals or devoted to milk production : demand for his store stock was slack on account of the much reduced grassland area, while the cost of wintering young sheep steadily mounted. Wherever possible, he followed the example of the valley farmer and went in for milk production, despite the unsuitability of his land for this purpose ; but this line of defence was open only to a limited number.

It was realized that special measures were necessary to support the hill farmer as such, and to provide for the day when home agriculture would

in the national interest again turn its attention to the production of meat, especially beef and mutton. These considerations led to the hill sheep and hill cattle subsidies and, later, to the Hill Farming Act of 1946 and the Livestock Rearing Act of 1951. These measures, side by side with the Marginal Production Scheme, have been of inestimable value in strengthening the economy of the Welsh uplands, and they have certainly attracted an encouraging response from the farmers concerned. The results are to be seen not only in improvements in living conditions and to fixed equipment, but also on the land and in the markets, in the form of more hill cattle and fat lambs produced on land which was covered with bracken ten years ago but which is now growing excellent swards established by close co-operation between the chemist, botanist, agricultural engineer and the farmer. A firm foundation has been laid for further and widespread developments in utilizing the human and natural resources of the Welsh hills.

BASIC STATISTICS : WALES and MONMOUTH

	1933	1953
	thousands of acres	
Tillage	335	549
Permanent grass	2,124	1,585
Total crops and grass	2,743	2,581
Rough grazings (in sole occupation)	1,727	1,354
	thousand head	
Total Cattle	857	1,017
Dairy herd	355	471
Sheep	4,318	4,427
Pigs	224	238
Poultry	5,071	5,229
Milk sales (*million gallons*)	52	190
Attested cattle (*% of total*)	—	65
	thousands	
Regular workers	49.5	34.2
Casual workers	7.6	12.3
Total workers	57.1	46.5
	thousands	
Horses	119	41
Tractors	1.9 (1937)	36 (1954)
Milking machines	1.8 (1942)	11.7 „
Farms connected to mains electricity (*% of total*)		26.5
	thousands	
Hill Farming/Livestock Rearing Act Value of schemes approved (at 31/5/54)		£6,964
Index of agricultural prices (1927-29=100)	77	275
Index of agricultural wages („)	98	367
	thousands of acres	
Forestry Commission acquisitions	104	256

WHO SERVE THE LAND

ALEC HOBSON, O.B.E.
Secretary, Royal Agricultural Society of England

ON May 9, 1838, a meeting was held at the Freemason's Tavern in London with the object of establishing a society which would render certain services to the agricultural industry. The meeting was "crowded to excess," and of the many noblemen and country gentlemen present, Earl Spencer (who had been Chancellor of the Exchequer and Leader of the House of Commons in the Whig Government of 1830) was voted to the Chair. That meeting established "The English Agricultural Society" which, two years later, became, under Charter from Queen Victoria, the "Royal Agricultural Society of England". Three days later the Provisional Committee met again and drew up a list of ten objectives which should serve as a guide to the Society in its task of rendering service to agriculture. So well did that committee carry out its work that those aims still cover the whole field of modern agriculture and continue to be the guide for the work of the R.A.S.E.

It would be well worth while to give careful thought on the first and last of them :

> (1) To embody such information contained in agricultural publications and in other scientific works as has been proved by practical experience to be useful to the cultivation of the soil ; and (10) To promote the comfort and welfare of labourers, and to encourage the improved management of their cottages and gardens.

The other eight bear the same hallmark of service to agriculture and to those who live on or by the soil. *Service*—that is the operative word. That is the principle which guides, or should guide, so many kindred societies of agriculture as well as shows, breeds, and the many ancillary interests which might be termed the "hand-maidens" of our farming industry. Whether a society makes a financial profit or loss on its year's working is a matter of concern only in relation to the effect on its ability over the years to render efficient service. The fundamental point is the amount of help and encouragement which that society has given during the year to those engaged in providing the necessities of food and clothing.

I hope I may be forgiven if I use the R.A.S.E. to illustrate these remarks. I do so merely because naturally I know more about it, though I also know a good deal of those allied organizations like the breed societies which were created as a result of the early Royal Shows. The aims which guide the R.A.S.E. are very similar to those which activate other societies, such as the Royal Highland, the Royal Welsh, the Smithfield Cattle Club, the Bath and West and Southern Counties, and the many hundreds of organizations which have come into being during the past century.

Many people think that the only work carried out by a big agricultural society is the staging of its annual show. While this represents a large part of its work, it is nevertheless only a part. All the year round committees and individuals are engaged in advisory work, the improvement of farm implements and machinery, the promotion of veterinary knowledge, agricultural research, the discovery of new varieties of grain and the dissemination of scientific knowledge among farmers. And there are machinery trials of one kind and another, including those relating to various competitions and, periodically, special trials, such as those in 1950 for forage harvesters and those in 1952 for potato harvesters, designed to secure for farmers the very best labour-saving machinery at an economic price.

This " extra-to-show " work is probably greater with the Royal than with any other show society. But every society carries in its train a considerable amount of " back-room " work. Some organize competitions for the best-managed farms, others for the best herds, flocks and crops, and so on. All of this represents a sort of voluntary effort on behalf of farmers and agriculturists and is work for which no payment is made or grants obtained from the Government.

Of course, agricultural societies and shows are by no means the only organizations which render voluntary service to agriculture. There is, for example, the enormous contribution of the National Farmers' Unions. Without them and their close liaison with the Ministries, it would be difficult in existing circumstances to carry on the business of farming.

The very many societies which govern the various breeds of cattle, heavy horses, sheep and pigs are all doing excellent work, though it appears to me that they have had to re-orient their objectives under the pressure of economic stress. Whereas formerly breed societies were largely composed of enthusiasts concerned only with breed improvement, they now have also to consider sales promotion as a vital part of their activities. Some of these societies have been in operation for a century or more. The Shorthorn Society, for instance, celebrates its centenary this year. Most of them can look back upon decades of work during which striking progress has been made in the quality and performance of their breeds.

A form of voluntary service to agriculture which receives comparatively little recognition among the rank and file of farmers is the research and advisory work carried out by some commercial firms. A visit to almost any of the laboratories and experimental farms of a progressive manufacturing concern leaves a feeling of wonder that any commercial undertaking which trades for financial profit can spend so much time, effort and money on matters for which they can only be recompensed in an indirect way, if at all. Many vital discoveries have been made as a result of this kind of voluntary service ; some, such as insecticides and fungicides, have changed for the better the whole pattern of food production throughout the world.

It is impossible in a short article to pay adequate tribute to all those who put in so much of their time voluntarily for the good of our great industry of agriculture. In addition to the undertakings to which I have referred, there are the landowners, farmers and land workers who have devoted so much selfless energy to the interests of our County Agricultural Executive Committees. Both during and since the war they have not only done an immense amount of practical work which has stepped up food production, but often in face of unfair criticism have made it possible for the various schemes—including grants-in-aid—introduced by successive governments to operate in the interests of the whole community.

These then are some of the organizations which are an integral part of Britain's greatest industry. There are others, like the Association of Agriculture, the many farmers' co-operative societies, the various workers' unions and a variety of educational, scientific, teaching and comparable institutions all making a direct and inestimably important contribution and nearly all depending basically on the goodwill, skill, knowledge and experience of individuals who seek no personal gain but who unreservedly serve the interests of others.

FARMING IN THE NEWS

J. ROBERTSON COUPAR, O.B.E., F.G.A.J.

THE vast changes in agricultural practice over the past sixty years have been paralleled in the press coverage and presentation of farming news. This was inevitable, since any properly functioning press organ must keep pace with the altering needs of its readers and developments making for progress and efficiency in the industry with which it deals. That, well beyond a century ago, agriculture was recognized as being of an importance to justify a press specially devoted to its interests is manifested in the many once familiar journals of this character which came into being in the first half of the nineteenth century. *Mark Lane Express*, for long the most outstanding of these, was established in the Reform Act year of 1832, and some of its contributors showed a wide knowledge of the various themes of agricultural interest of the period.

In the main, however, the coverage scope of these early journals was definitely restricted. Their contents varied to suit the small circles of readers they were designed to attract. One might cater exclusively for the comparatively small cultivator ; another for the more extensive farmer ; a third for those engaged in those pedigree livestock developments which were a feature of the time. Little attention was given to the general day-to-day news of the industry.

Forerunners of the N.A.A.S. Yet the best of these publications did much for the advancement of farming practice and might, in a way, be regarded as the forerunners of the National Agricultural Advisory Service of today. Let me illustrate. Some time before the first issue of the journal now known as *Agriculture*, a young man engaged in the East Indian trade in the City of London was warned that he would assuredly lose his sight unless he transferred himself to the countryside and an open-air life. He was over eighty and Chairman of his County Council when he told me : " I took up farming knowing little of the job and with few willing to advise me. That I made a success of it was entirely due to the agricultural press and two articles I read in it. The first urged the value of potash in the growing of barley, a crop for which my land was particularly suited ; the other advocated the choice of early-maturing cattle for feeding, and their fattening off at two instead of three years. Both practices brought me profit. But for their adoption, I think I might have failed."

Pioneering Family The fact remains, however, that up to sixty years ago there was no farming paper covering the entire field of agricultural interest. But a change was at hand. Operating from Warrington was a paper, founded in 1843, which, after appearing under various names, had now adopted the comprehensive title of *The Farmer*. The then editor of the *Mark Lane Express* conceived the idea that here was an opportunity to develop an ideal—the ideal of a journal which would cover all phases of agricultural interest. He resigned his post to buy the paper, and, on transferring it from Warrington to London he gave emphasis to his purpose by altering the title to *Farmer and Stock-Breeder*.

This man with a mission was Alexander Macdonald, member of a clan destined to play a great part in the development of agricultural journalism towards the standards of today. He did not find it easy to win success for his ventures. For a time the weekly circulation did not rise above a thousand and the revenue from advertising did not exceed some £15 a week, but his faith did not falter.

He died before success was fully won, but before his death he had assumed Mr. T. L. Martin as his partner, and to this partnership, with Mr. James Macdonald as Editor, came the reaping. Early in the new century circulation had passed the 14,000 mark and was rising by some 5,000 annually ; when the First World War broke out it had reached 78,000.

Alexander Grant, like the Macdonalds, a Banffshire man, joined the paper after graduating at Edinburgh University, and James Macdonald and he, adhering to the ideal of an information service for all sections of the industry, found their reward in the until then unheard of circulation for an agricultural journal in Britain of 100,000.

Giants of Their Day Their triumph was the more remarkable since it was achieved in competition with giants in the farm journalism of their day—men like Stanton of *Farm, Field and Fireside*, and my old friend George Burrows of *Livestock Journal*, both papers which were ultimately incorporated in the *Farmer and Stock-Breeder*.

James Macdonald died in 1923, and was succeeded as Editor by Grant, who continued in that office after the sale of the paper in 1925 by Macdonald and Martin, Ltd. to Iliffe and Sons, Ltd., until his death in 1942.

Today, under the control of Sir Richard Haddon as Managing Editor and Mr. Alan Ramsay as Associate Editor, and with a still further expanded circulation, its aim, amplified to meet the changes of the times, is still that which inspired Alexander Macdonald sixty years ago.

Sales well into six figures, too, are ascribed to the *Farmers Weekly*, which came into existence twenty years ago as a joint adventure by Lord Beaverbrook and Lord Rothermere, and was sold soon afterwards to its present owners, The Hulton Press Ltd. For nearly the whole of its existence it has been under the editorship of Mr. Malcolm Messer. It, too, affords a catholic coverage of farming affairs, and the experience of both papers illustrates how vast is the readership of the weekly agricultural journal today.

The National Press The incursion of two national press barons into the field of agricultural journalism was not without significance. It was a product of the expanded interest in agricultural affairs within the national dailies themselves. Sixty years ago there were few journalists on these dealing exclusively with agriculture. Today, not only the provincial dailies for whom, in many cases, agriculture is the biggest single interest in the area, but the London nationals which aspire to wide country readership, have their specialists in farming affairs.

This contrasts with the days when only *The Times* had its Agricultural Editor—Charles Macdonald, an uncle of the James Macdonald I have already mentioned. For the more popular type of dailies, development of agricultural interests involved something of a novelty in presentation.

A means had to be found of so presenting stories from agricultural sources as to interest the preponderating town and city readers while, at the same time, giving at least a measure of satisfaction to those of the countryside. So we have had increasingly in the past forty years, the "angled" story and " personalized " news, which, if giving little satisfaction to the seriously minded provincial writer on farming subjects, have certainly widened urban interest in the land and its produce.

Perhaps one of the greatest changes of all has been in the degree of precedence given to the various interests. Sixty years ago, horses claimed pride of place, followed by other livestock, tillage, questions on fertilizer

usage, and some careful references to mechanization. Today machinery has a whole range of papers exclusively devoted to it, in addition to constant coverage in the general farming press. Poultry interests are similarly placed. Seed varieties, the results of scientific research, the production and utilization of grass—each has its place in that press service of farming which has developed in the lifetime of this JOURNAL.

And agricultural politics and economics, almost taboo in the 1890s, have attained to a news space few subjects can rival. Farming is in the news to a degree undreamed of then, and no farmer today can afford to overlook the information which the press provides.

FARMING ON THE AIR

JOHN GREEN

British Broadcasting Corporation

THE problem of communication has always been crucial for agriculture. The market place derived its glamour from its sheer necessity as the weekly means of exchanging views and information. Then at the end of the last century came a consciousness of "extension" work, as the complexity of agriculture increased and the full implication of the Royal's motto of "Science with Practice" was appreciated. This derived a peculiar impetus from the North American continent, where farmers of diverse European stock were finding themselves strangers in an even stranger land. Across the Atlantic the County Agent and the Land Grant College had become established, and if bulletins and farm visits were beginning to play an essential part in world agriculture, it was inevitable that broadcasting would augment their impact as soon as it achieved rural universality. In America we read that the first farm broadcasts were from Station KDKA, Pittsburgh, as far back as 1921. At the same time there was some experimental market reporting and amateur broadcasting from the campus of the University of Wisconsin at Madison. In this connection the first extension worker in Britain to use the new medium of broadcasting would appear to have been T. R. Ferris from the B.B.C.s regional station at Bournemouth. This is especially significant when we recall that his young apprentice of those days was none other than our latter-day "star", Ralph Wightman !

There was some farm broadcasting from Edinburgh in the 'twenties but a broadcasting "service" did not appear until the early 'thirties. The reason was that a programme "service" requires reasonable broadcast coverage and ease and cheapness of listening. The position is similar today with television, which has just about reached a majority of farm homes and fair geographical coverage.

"Old Masters" The first regular series of agricultural broadcasts did not start until the autumn of 1934, exactly twenty years ago this month. The first farm broadcaster was the late John Morgan (M.P. for Doncaster, 1938-40). He was then agricultural correspondent of the *Daily Herald* and not yet in the House of Commons. He spoke weekly throughout the whole winter session and might well have become the 'Middleton' of farm talks had it not seemed advisable to have a wider range of personalities

in view of the greater political and economic tensions that are inevitable in so essential an industry as agriculture. When Professor (now Sir James) Scott Watson took over from Morgan in the autumn of 1935, he was not a newcomer to broadcasting. He had broadcast spasmodically from Savoy Hill in 1928 and 1929 and done his famous broadcast rural ride in the Cobbett style. Few men had a more natural broadcasting style, and it seems difficult to recall how popular were all these early speakers who had something of the present-day appeal of the Archers. Not only did the mere fact of discussing agriculture stir the nostalgic longings of townspeople who recalled some part of their rural youth, but they went to the very heart of an industry gripped in the depth of depression and conscious that the tide must soon turn in their favour. W. S. Mansfield recalls entering a Cambridgeshire pub late one afternoon and overhearing one of a handful of farm workers say, " Drink up, chaps. It's Scotty on the wireless tonight."

The Morgans and Scott Watsons were not alone in the pioneer days of farm broadcasting. Anthony Hurd occupied the autumn session in 1936 and was followed by J. G. Stewart. J. G. Stewart was a tower of strength to the B.B.C. at the Ministry, and few in the Ministry's service had the taint of land clinging more certainly about their Whitehall office or knew better the reaction of the practical man to theory and policy. I remember how I looked to J. G. Stewart before the war as I looked to Anthony Hurd during it, and to Sir James Scott Watson in more recent years, as personalizers of policy—a gift so essential in farm broadcasting.

Another man who had the supreme gift of talk was W. S. Mansfield himself. Mansfield in 1937 seemed to create in the old National programme the very flavour of high farming. If he tackled a topical question like establishing a pasture or milking a cow, he could paint in the vivid classical background. He made farming seem important, eternal and fundamental. Mansfield was an artist in sound and is one of those to whom television would have added nothing. The screen would have seemed a mere photograph of reality beside the historical depth and philosophic tone which he created for his listeners. Each talk was an essay and in their published form are still worth reading.

Early Farming Series Agriculture always took the lead in the use of broadcasting techniques, and indeed the first discussion of which we have any record at Broadcasting House was between Gerald Heard and A. G. Street, with Scott Watson in the chair. It was not on a strictly agricultural subject but the technique was carried further in early experiments in " Midland Parliament." The early broadcasts pioneered by Denis Morris and the more youthful Tristram Beresford were often on agricultural subjects, and I can well remember one before a studio audience in which Sir Reginald (as he later became) Dorman-Smith, A. P. McDougall of Banbury, the late Viscount Astor and John Wain took part. They were discussing agricultural policy shortly after the publication of the Astor-Rowntree book. These broadcasts laid the foundation for those more virtuous and sophisticated series " Cattle at the Crossroads," " On Your Metal " and " Green Pastures." In these war-time broadcasts the B.B.C. probably achieved a climax in the educational use of broadcasting for adults. I remember that Mansfield's series " Cattle at the Crossroads " coincided with that revival of interest in heredity and milk recording which followed the war-time milk policy and the still canvassed prospects of artificial insemination. Many fine dairy herds began grading up at that time, and there is little doubt that their owners were influenced by the topics then discussed. We were assisted, too, in

those days by the absence of mobility in the countryside due to petrol rationing and the fact that rural evenings before the black-out offered little diversion from the common task. The Ministry of Agriculture allowed special petrol to attend discussion groups, which were notably successful in Yorkshire and Lancashire. The Ministry also processed recordings of discussions which could be played at Young Farmers' meetings and at discussion groups in remote parts of the country. The published scripts of those broadcasts are still of value, as I discovered only the other day in a practical situation when all my veterinary books failing me, I remembered vaguely a brilliant discussion on sheep diseases with W. Lyle Stewart at Newcastle during the war. " Green Pastures," too, which was perhaps not the most popular as a broadcast series, remains, I am sure, in its printed form the only classic exposition of ley farming, and as such I found it being accepted in farm institutes and colleges throughout the world.

Short Wave and Television An aspect of broadcasting which was calculated to have an influence on the contracting world of agriculture is the short-wave service. It is hard to conceive the rapidity of its development during and since the war. Last month I was discussing with a well-known agriculturist the occasion of the last Royal Show at Windsor, and he reminded me that he was in the Argentine at the time and had heard my voice somewhere in the foothills of the Andes. This was the first positive proof I had received of what we thought fifteen years ago had been a significant occasion. That week from a little one-room hut behind the Grand Ring we broadcast for the first time in English and Spanish for the New World and in Arabic for the Middle East. Two months later war had started and during the anxious period of United States isolationism agricultural programmes were included among the propaganda broadcasts to farmers in the Middle East. It is well known how these broadcasts survived the anxious period and how later many of us exchanged visits with the United States after Sir James Scott Watson had been established in Washington as Britain's agricultural attaché. Since then, association between agricultural broadcasting on either side of the Atlantic has increased. Members of the powerful National Association of Radio Farm Directors have used their influence to establish a similar association in Europe, and its first President is H. C. Hunt, the present Agricultural Liaison Officer of the B.B.C. The leading farm radio directors of North America are well known to those engaged in agricultural broadcasting in this country, as well as to their Canadian, Australian and New Zealand counterparts. Farmers probably have little idea of the number of broadcasts that are exchanged annually between English-speaking countries of the New World. The weekly B.B.C. programme " Land and Livestock," in which an ever-increasing number of farmers and scientists in this country have appeared, is probably the most up-to-date agricultural international news service that exists. The results of conferences, agricultural shows and sales are collected and disseminated from London for the use of pastoralists and farmers in all parts of the world.

Side by side with short-wave broadcasting have come the equally rapid strides in television. Tentative beginnings in agricultural television were made at Alexandra Palace before the war, and some viewers will remember the broadcasts by A. G. Street from Bulls Cross Farm. Since the war the potency of agricultural television as a medium of education has been constantly watched by the B.B.C. Two factors to date have prevented its wide-scale development. In the first place, a single programme and the shortness of broadcasting hours have not justified a "service" programme to so small

a section of the community as agriculture. In the second place, universal coverage of the country and the spread of viewing facilities to the majority of rural areas have resembled the situation of sound in the 'twenties. However, in October 1953 the B.B.C. Television Service appointed Godfrey Baseley of Midland Region to be their first Rural Programme Organizer. The rival merits of film and "live" television have been canvassed and tried. For three years now at some of the main agricultural shows elaborate programmes have been produced, and this year at Windsor three hours of television time was devoted to the Royal Show. There is still some conflict between camera technique and agricultural editorial, but the day cannot be far distant when a "service" for farmers will be possible. Undoubtedly the potential of sight as an educational aid will further raise the value of broadcasting as a universal method in advisory work.

The present Agricultural Advisory Committee has grown out of the Broadcasting Planning Sub-Committee, set up by the Minister of Agriculture during the war. In those days, Anthony Hurd was its Chairman, and in the grimmest times the scintillating wit of Donald McCullough would often be abruptly punctuated by the crash of a bomb or " doodle-bug " in the neighbourhood of Whitehall Court. From the start that committee was something far more imaginative and important to broadcasting than a mere supervisor of policy directives. When the Corporation regained its complete editorial independence in 1945, it adopted its personnel as it stood and has added to it ever since on a biennial rota of retirement. Scotland and Northern Ireland have their own committees, but their chairmen are ex-officio members of the central committee in London. The Chairman since 1945 has been W. S. Mansfield, and two members of the Ministry are by arrangement ex-officio members. In this connection one must recall Arthur Knee, who was such an enthusiast of farm broadcasting from 1940 onwards, and who, after his retirement, was succeeded by A. N. Duckham, while the N.A.A.S. has been represented since the war by Sir James Scott Watson. Undoubtedly the success of this committee has been the fact that its members have never been solely representative of outside bodies but have been persons interested in broadcasting for its own sake, and most of them have been seasoned practitioners.

The Future If thirty years have brought broadcasting thus far in the service of agriculture, it is hard to foresee what it will achieve in the thirty years ahead. This will be a diamond jubilee on which a new generation must ruminate and reminisce. I have always believed that a world conscience among primary producers would contribute both to the wealth and well-being of mankind. Ignorance and isolation have for long been the barriers peculiarly placed by politics and geography on agriculture as an industry. Today those barriers have disappeared ; and the Sydney, Hot Springs and Quebec conferences, the Nuffield and Kellogg foundations, and the agricultural attachés of the various diplomatic corps have created a situation that was unknown before 1939. Into this world broadcasting may well have more to contribute than any medium of communication in the past, because of its immediacy and personal approach. It is my fervent hope that it will ever stimulate the rural mind to think and so prevent a return to inertia, social and technical, which in the past has brought deserts to the plains and hunger and revolution to the nations of the earth.

OUR CLIMATE

L. P. SMITH

Meteorological Office, Air Ministry

WHEN the climatologist speaks of a change of climate, he is often thinking in terms of hundreds, or even thousands, of years. When a farmer talks about it, he is thinking of the difference between *his* weather and his father's or his grandfather's. The time scale is thus considerably different, and the scientist would prefer to call the countryman's type of climate change a "trend". Such climate trends tend to appear, persist for some years and then disappear ; they are not real changes of climate in the true sense of the word.

Statistically, such trends or short-lived changes are not "significant". In practice, they may be very significant. In a profession such as agriculture, which depends so much on the weather, they may be very important. One of the main reasons for this is that a farmer is not principally concerned with mean values of a meteorological element, taken over half a lifetime ; he is much more worried by the number of times the value of one element falls below or rises above a certain value, which for his purpose is a limit. He is thus more concerned with frequencies and sequences—one bad year in five may be tolerated, two successive bad years may be disastrous. To look back over the last sixty years, we can refer to the published weather statistics, or, more conveniently, to a survey of them such as *A Century of London Weather*.* Even so, it is not easy to pick out the details we require because the limiting values which so concern a farmer are not known exactly.

March Rainfall Take, for example, the March rainfall over the farming lifetime of the present (older) generation 1924–53, and over their father's working life 1894–1923 ; the comparison of figures is easy, their interpretation in terms of spring farming activities is more difficult. Fig. 1 shows the distribution of the March rainfall totals for Kew over the two sets of thirty years. Let us assume that rain under 20 mm. (0.8 in.) will give rise to the " peck of dust " and thus favour spring cultivations and the preparation of a good seedbed. There were only two such March rains in the earlier years ; during the last thirty years there have been twelve !

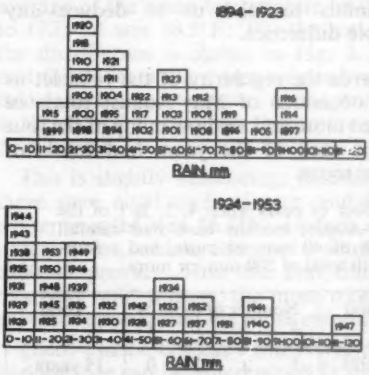

Fig. 1. March Rainfall, Kew

The March rainfall average at Kew changed from 48 mm. to 35 mm. ; a similar but slightly smaller change took place during the same period over the rest of the country. Nevertheless, no physical reason can be found for this change, and because it is not significant statistically, it is said to be due to "pure chance." It is possible, therefore, that the next thirty years will see an elimination of this " drier March " tendency, and that spring conditions will deteriorate slightly from the point of view of the arable farmer ; on the other hand, they may persist, and nothing we know at present can determine the issue one way or the other.

* W. A. L. MARSHALL. H.M. Stationery Office. 15s.

Summer Rainfall Turning to the harvest conditions, our most convenient meteorological check is the total August rainfall. This will not take into account the harvest begun in July, or the months when large amounts of rain fell on only a few days, but it will give a simple general picture. The August totals are shown in Fig. 2 ; the thirty-year averages for the month changed but slightly —from 57 mm. to 59 mm. Taking "good" harvest years as those with an August rainfall below 40 mm. (1.6 in.), the frequency changed from 11 to 9 ; for "very good" conditions (below 20 mm. or 0.8 in.) the change was from 2 to 5. At the other end of the rain scale, the frequency of bad harvest conditions was practically unaltered. We can read very little into these figures, and it is very probable that any change in the difficulties or ease of harvest was due far more to increased mechanization than to any slight alteration in August weather.

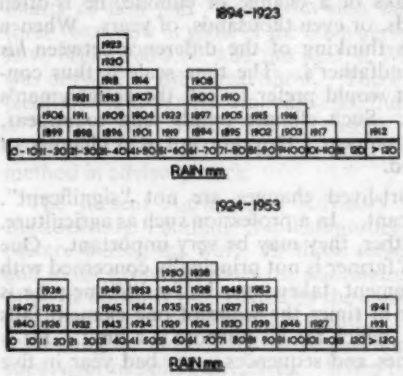

Fig. 2. August Rainfall, Kew

It is difficult to make a simple meteorological assessment of the growing season itself, but we can make use of the fact that green crops need a regular and adequate supply of rain from May to August. The average four-month total for 1894–1923 was 210 mm. (8.25 in.) and for 1924–53 it was 207 mm. (8.15 in.)—very little change. The distribution is shown in Fig. 3. The summer rainfall over the last thirty years has been slightly more consistent, there being nothing so extreme as the drought of 1921, when the May-August rain at Kew amounted to only 59 mm. (2.3 in.) and nothing so depressing as the deluges of 1903, when the total was 476 mm. (18.7 in.). Otherwise there is nothing in the totals to lead us to deduce any appreciable difference.

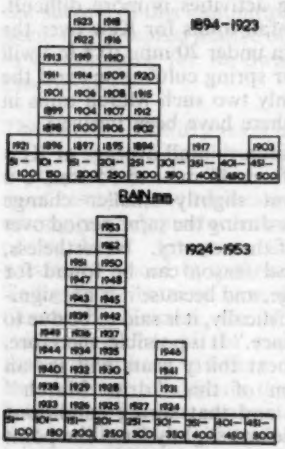

Fig. 3.
May–August Rainfall, Kew

As regards the regularity of the rain, let us take the occasions of May-August totals of 200 mm. or more and see how many of the four months in each of the years had totals of 40 mm. or more.

Number of years when 4, 3, 2, 1 of the May-August months each had rainfall totals of 40 mm. or more, and a four-month total of 200 mm. or more.

Period	Number of months 4	3	2	1	Total
1894–1923	5	8	2	0	15 years
1924–1953	7	9	0	0	16 years

Thus the latter period has a slight gain in consistency of summer rainfall.

If we examine the months with very little rainfall, we find that for May to August in the first thirty years, there were eight months with less than 0.5 in. of rain ; in the second thirty years there were seven months, but three others had 13 mm. or 0.51 in. of rain, so that the difference is negligible. In effect, we can thus trace no appreciable change as regards the rainfall conditions in the summer months.

Spring Frosts In horticulture, the main climate worry which steals the headlines is the late spring frost. Using the Kew data for examination of these is rather difficult, because minimum temperatures in London are quite a few degrees higher than those in the orchards, and the effectiveness of frost depends a great deal on the stage of development of the fruit buds and blossom. The distribution of the lowest air temperatures at Kew in May is shown in Fig. 4. If we assume a Kew minimum of 32°F. is equivalent to a damaging temperature in the neighbouring countryside, then the total in thirty years has changed from 1 to 3 ; if we take 33°F. as the equivalent, then the change is 3 to 7. The figures are small, but suggest an increase in May frosts of significance to the fruit farmer.

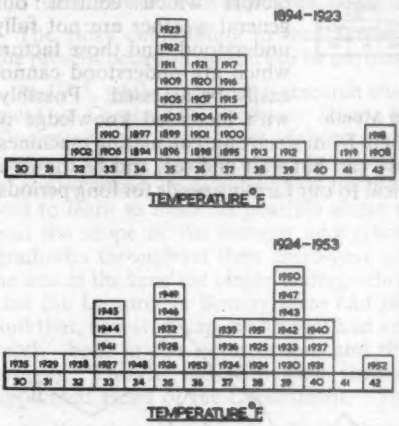

Fig. 4. Lowest May Temperatures, Kew

It is interesting to note that the coldest May nights in the last thirty years, occuring in 1935, 1929 and 1938, came about when the March rainfall of the same years was low (see Fig. 1). The tendencies to dry springs and late frosts may not be unconnected, because dry ground cools more quickly than wet ground.

Winters : Warmer or Colder ? Finally, what of our winters ? Are they getting colder or warmer ? The thirty-year average of the mean temperature of the coldest winter months for 1894–95 to 1923–24 was 38.5°F. For the period 1924–25 to 1953–54 it was 37.9°F. ; the distribution is shown in Fig. 5. There is a big change here, for the first thirty years there was only one winter month with a mean temperature below 35°F., and that was in the first year of the period—February 1895 : in the second thirty years there were six such winters, with at least one very cold month.

This is slightly misleading, because in the thirty years previous to 1894, there were eight such winters, and the thirty-year average of the coldest winter months was 36.4°F. In fact, during the period 1841–92 there were sixteen years, which, taken as a whole, were colder than the coldest of the 1900–49 period. Thus the first thirty years 1894–1924 was a period of relatively mild winters, the more recent years have had colder weather, but have not approached the more extreme conditions of the previous century.

There can be endless controversy as to the trend of our future weather. Periodicities can be found which fit the past facts and then break down when extrapolated into the future. A case in point is the " every third year " late frost frequency which appeared to be valid between 1929 and 1944.

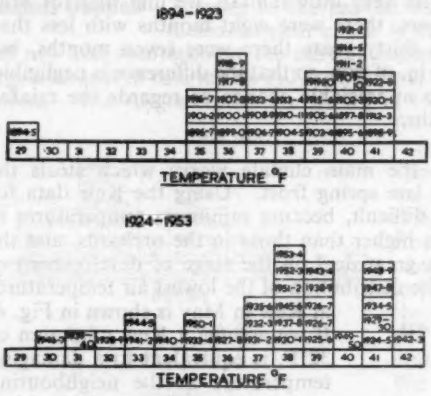

Fig. 5.
Mean Temperature of the Coldest Winter Month

Fig. 6 illustrates the running five-year means of the lowest May temperatures at Kew, arranged in three series.* From these graphs it is easy to see that the series containing the periodic frost years had a running mean well below the other two series from about 1915 to 1945. This eccentricity did not hold before these dates, and there is no reason why it should do so in the future. The factors which control our general weather are not fully understood, and those factors which are understood cannot easily be assessed. Possibly, with increased knowledge of atmospheric physics, and increased help from electronic calculating machines, progress will be made. At present we can but wait and see, and be thankful that the British climate is rarely inimical to our farming needs for long periods.

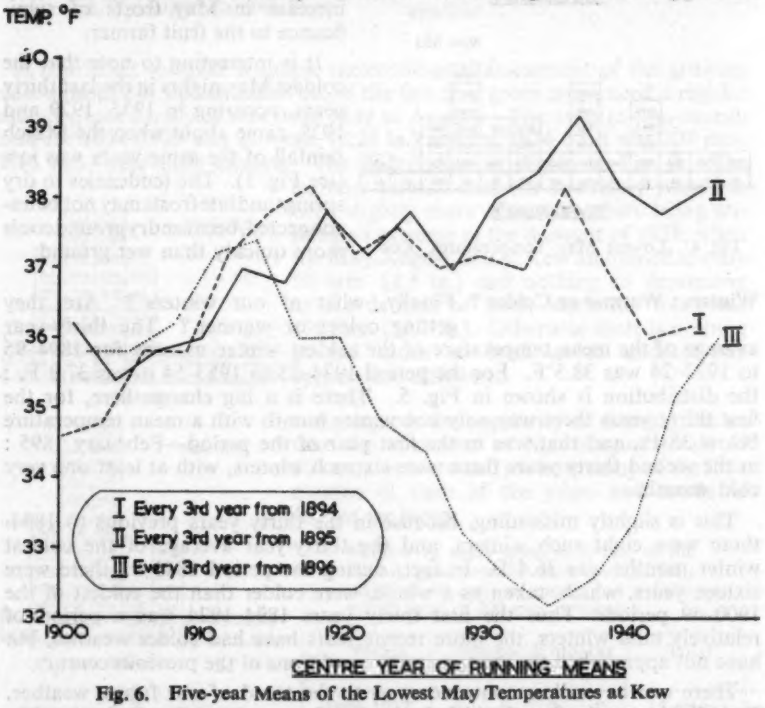

Fig. 6. Five-year Means of the Lowest May Temperatures at Kew

* *Note.* Series I contains every third year from 1894. The first point is the mean of the May absolute minima in 1894, 1897, 1900, 1903 and 1906 ; the second point is the mean for 1897, 1900, 1903, 1906, and 1909, and so on. Series II contains every third year from 1895, treated in the same manner ; Series III contains every third year from 1896.

I REMEMBER

A MISCELLANY OF RECOLLECTIONS BY SOME OF THE OLDER GENERATION

Are days of old familiar to thy mind, O reader?
Southey

IN the account of the history of the Long Ashton Research Station, given last year in its Jubilee Volume "Science and Fruit" the following passage occurs :

> The Director soon began to make contacts with the staff of the University College at Bristol, and in particular with J. H. Priestley, then head of the Department of Botany. With the latter he arranged to give courses of lectures in Mycology in the College and in return the staff of the Department helped in the investigations of the Institute.

The story culminating in that agreement has never been recorded, and the present occasion appears to be particularly appropriate for its publication.

In 1903, while I was still a research student working in the Botany Department at Cambridge, Professor Harry Marshall Ward, then Head of that Department, brought to my laboratory a young undergraduate from University College, Bristol, to see the investigation in progress. In the course of conversation, he disclosed that the main purpose of his visit to Cambridge was to learn as much as possible about the organization of the Department and the scope of the lectures and practical work provided for the undergraduates throughout their three-year course in botany. It transpired that he was at the time the senior undergraduate student in that subject at Bristol, that the Lecturer in Botany there had just died in the middle of the session and that, as a stop-gap, he himself had volunteered to undertake the teaching work—both in the lecture room and the laboratory—until the end of the session. This he did with such success that, on its conclusion, he was appointed Head of the Department. The student in question was Priestley.

At that time it seemed unlikely that our Cambridge meeting would be anything more than a passing contact : but developments of which we were unaware were stirring. The closing down of the Bath and West Society's experiments in cider-making at Butleigh Court, Somerset, had led to recognition by the Board of Agriculture of the desirability of an organized research centre for that subject. In due course the National Fruit and Cider Institute came into being and I was put in charge of its work at Long Ashton. I had a staff of a fruit foreman, a seasonal cider-maker and two labourers for the manual work associated with its ten acres of land and the cider-house ; the "laboratory" was a small lean-to wooden shed. This to service also in an advisory capacity the six cider-making counties of the West of England! The prospect of research was indeed gloomy.

Soon, however, Priestley, recalling our Cambridge contact, invited me to inspect a site which had been offered to his Department for a botanical garden. That was the beginning of a close personal friendship, which quickly led to the co-operation mentioned above. Without the latter, it would have been almost impossible to have achieved sufficient results from Long Ashton to have held the vital financial support of the contributing counties. For the rest of his life Priestley continued to assist our investigations with stimulating advice on any matters on which his unique knowledge of plant physiology could be of service.

Professor B. T. P. Barker

* * *

I CAME to Suffolk in 1898, fifty-six years ago—from West Lothian in Scotland. How different are things today! At that time there were no motor cars, except a few of the kind that now make their annual adventurous journey from London to Brighton. There were no tractors either. In those days all the ploughing, cultivations and road transport were done by horses. Now there are scarcely any horses left on the farms. I bought a two-furrow motor plough in 1914, but it was not until about the middle of the First World War that tractors were used on farms to any extent. The first tractors were two English ones, but when the Food Production Campaign started in 1916-17 many American makes were imported. Some of these were fearfully and wonderfully made, but nevertheless they did quite a lot of useful work.

When I came to Suffolk there were very few binders in use in the county, and when I bought a 5-foot machine in 1899 I was solemnly assured by our local blacksmith that it would never work on our land. At that time a binder cost £35 ; now they cost nearly ten times that figure. The reign of the binder has lasted a little more than fifty years, but this machine is now rapidly going out of use.

Previous to the advent of the binder, wheat, oats and beans were cut with a reaper or side delivery machine and tied by hand. Barley was always mown with the scythe and carted loose ; it was never cut by machine and tied. The belief at that time was that when barley lay loose in the swath it became mellowed by the dew. It was then turned by hand for some more dew to fall on it. How much there is in this belief I cannot say, but some adventurous spirits risked cutting barley with the binder without any apparent injury to the quality !

David Black

* * *

I REMEMBER Old Man Tradition very well. Rather a despot he proved ; very sure of the way things should be done ; always full of warnings about risks and gloomy prognostications—" It wunna pay " was his standard comment. All this tended to check enthusiasm for things that were new and apparently promising ; our confidence and zest for adventure was damped, and when we did move onwards we went fearfully and haltingly, only half crediting our own ideas.

The Old Man retired from the stage some years ago and, save for occasional noises off, his voice is heard no more. Nowadays men venture out with confidence on uncharted fields, undaunted by risks of failure, unconcerned with the fact that the enterprise is not in the book of words. What matter ? The project can be argued out from first principles. The laws of crops and animal husbandry are neither completely known nor immutable. Still less are the laws of economics. Inexperience is not necessarily a bar ; you can learn as you go. Novelty may indeed prove advantageous as leading to closer observation. The whole approach to farming has changed.

How great a share in the revolution education and research can claim and how much is due to the blind forces of economics—who shall say ? Fortunately a remembrancer is not expected to pronounce judgment.

W. B. Mercer

* * *

I REMEMBER

IT was in 1894 that the agricultural college at Wye was founded by the County Councils of Kent and Surrey. The memory of my introduction to it is as vivid as if it happened yesterday. It had been decided that I was to make my living on the land, and in July my father and I went down to have a look at this new venture in agricultural education and to meet A. D. Hall, the Principal just appointed. Cardinal Kempe's old college was still in the reconstruction stage, and it must have been the wettest day of a wet summer, for I remember leaping about over pools of water, mortar heaps and builders' rubble, while the rain poured down and Hall explained gloomily how good it was all going to be. Thus it happened that I was the first student to set foot in the College, although I did not go into residence until the following year ; thus, too, began a friendship with its first Principal which was to ripen, year by year, through the next half-century.

Hall, himself a Balliol scholar and a chemist, had collected a brilliant small staff, first-class scientists who were applying their knowledge to the farmer's problems. There was F. B. Smith, of Downing College, Cambridge, the Vice-Principal, who went out to South Africa with Lord Milner, after the Boer War, to organize the Agricultural Department of the new Union ; John Percival, also of Cambridge, a botanist, always known as " the Professor," who became holder of the Chair of Agricultural Botany at Reading ; H. H. Cousins, an Oxford chemist, who went to Jamaica as scientific adviser to the Government ; F. V. Theobald, a Cambridge zoologist, who wrote the first monograph on *Culicidae*, the mosquito family. We students were a small, but very hearty community, who formed a squad in the Ashford Company of the Volunteer Battalion of the Buffs, and ran a cricket team in conjunction with the village in the days when village cricket in Kent was cricket at its very best. We had our own soccer team, but the rugger players depended on occasional games with the Thanet Wanderers, run at that time by the Weigall brothers, and on scratch teams organized by a grand old muscular christian, Canon Cartwright, of St. Augustine's College, Canterbury. For the rest, most of us worked pretty hard, and fought friendly battles with the Principal over things such as compulsory church attendance, his taboo on Wye races, and the place of the public house in rural social life. We owed much more to Hall than we realized at the time. From the first he was at pains to mix things up for us, so that agricultural education should not begin and end in the labs and in the farmyard. There were occasional lectures on general subjects, the only one which I can remember being on bimetallism, still a live economic theory in those remote days !

There were no University degrees in agriculture at that time, and we worked for the College Diploma and certain external examinations, such as the Diploma in Agriculture of the University of Cambridge, the Diploma of the R.A.S.E., and the professional qualifications of the Royal Institute of Chartered Surveyors. A red-letter day was that on which Alexander Holm, senior scholar of his year, was awarded the Gold Medal of the R.A.S.E. in their Diploma examination, 1897, when Hall appeared in the Junior Common Room, after dinner, followed by the College butler bearing a tray of port decanters, and we drank *Floreat Domus* and the good health of the successful scholar.

Of all that happy family of sixty years ago, not more than three of us, I think, are left.

C. S. Orwin

* * *

WHEN I began farming in Essex in the 'nineties the prospects of the agricultural industry were bleak indeed, for the county had been badly hit by the great depression of that period. These were the days when hardy Scots emigrants took over at nominal rents farms which threatened to become, or actually were, derelict, and then proceeded to change the arable aspect of the county to that of a dairy farm and market garden. By 1900 very few of the old stock of yeomen farmers were left in East Anglia. In time, agriculture recovered, but in those days few realized the danger to the country of a weakened basic industry. Thus in 1914 much valuable time and energy had to be spent mobilizing all the resources of agriculture for the benefit and safety of the country. In those days, too, there was no strong organization of farmers available to collaborate with the Board of Agriculture or the newly-created Ministry of Food. (It may not be generally known that the proposal to constitute the Board of Agriculture as a Ministry was proposed by a resolution of the N.F.U. Council).

During most of my farming life I have been identified with the work of the National Farmers' Union ; first as a member and office bearer of the Essex Branch, which was formed in 1914, and later as a member of the Council and, in 1934, President of the national organization in London. In these capacities, I have had long association with successive Ministers of Agriculture and, more particularly, with their Departmental officers at Whitehall—a vantage point from which I have seen so many developments in agriculture. Looking back, I note my own growing interest in developments such as farm mechanization and rural electricity, and perhaps more especially in the lusty infancy of the home sugar beet industry.

S. O. Ratcliff

* * *

WYE College was started in the same year as this JOURNAL. I joined the staff of the College seven years later. Farming was at a very low ebb, food was pouring into the country from overseas, much of it was sold at prices with which our farmers could not compete : they cried out for protection, but instead were offered only education—in which many of them had little faith. Agricultural science was moribund in this country ; it was practically all contained in one little book of 240 pages, Warington's *Chemistry of the Farm.*

Specialization had not begun. I had to lecture to students and farmers on soils, fertilizers, feedingstuffs, dairy problems, insecticides, fungicides, and other topics, to supervise analyses made for farmers of all these and also of drinking waters ; also to visit farms and advise on all manner of problems, from the retrieval of some failing crop to the education of a promising child. At the farmers' lectures there was commonly a sceptical and even hostile element. The local funny man in the back row would fire off some irrelevant question (a favourite one was : " Which end up do you plant beans ? "), and unless you dealt faithfully with him at his first effort you had no peace. But our good intentions were recognized : at a talk to smallholders and farm workers, where I had tried to explain some knotty problems, the spokesman thanking me said, " The lecturer 'as been hintelligent, but not too hintelligent for us " !

Gradually as we learned our way about we were able to build up a sound agricultural science, the value of which farmers were shrewd enough to recognize. Our crowning satisfaction came in 1921, when the Government of the day had to abandon the promised price for wheat, and as part com-

pensation the farmers, asked that £1 million should be devoted to agricultural research. That spirit of friendly confidence has continued, and so long as it lasts we may remain hopeful for the future of British agriculture.

Sir E. John Russell

* * *

THE pool of memory contains in its depths a multitude of recollections, but what comes to the conscious surface is as capricious as the varied stimuli that, through association, bring vivid flashes of a past one had believed forgotten.

Thoughts of the countryside sixty years ago brings me recollections of a stretch of the Great North Road, before the coming of motor cars and bituminized surfaces where, separating the tracks worn bare by hoofs and wheels there were rough ridges of macadam bedecked by the silvery foliage and bespangled by the golden blossoms of silver-weed. If the roads were weedy they were at least interesting, and every cornfield was then a surprise packet that might reveal the scarlet cups of the red camomile or, to give it its book name, Pheasant's Eye, or the classic grace of the purple corn cockle. In August the rich brown plumage of the corn-crake could be seen moving swiftly between the wheat tillers ; its harsh cry was as familiar then as the note of the quail, though today both alas are well-nigh stilled.

The darnel grass that was so common in Shakespeare's day, with all the other " idle weeds that grow in our sustaining corn", had, sixty years ago, like the carter's smock become a rarity. It was in fact a countryside, beautiful rather than utilitarian, that appealed by the very sense of freedom engendered by the absence of the "cabined and confined" constraint that has become a necessary part of the agricultural food factory of today. If we must sacrifice one type of beauty for economic success, let us not underrate the value of what we have lost but seek to ensure that it is replaced by another beauty—that of functional efficiency.

Sir Edward J. Salisbury

* * *

ON the advice of my Edinburgh Professor, I decided in 1910 to go to the American Middle West for a year's post-graduate study. My estimate of expenditure was £120 ; I had a hundred pounds left out of a scholarship, and I "touched" a rich uncle for the balance. But, as it happened, my "project" involved a good deal of travel, which was not provided for in the estimates. I put my problem to a member of the Extension staff, who responded with an offer of two weeks' employment in laying out maize trials during the Easter vacation. The pay was princely—two dollars a day—but it went only half way to closing the prospective gap. There was only one thing to be done—I must get to Chicago and back, for the International Livestock Show, without paying my fare.

The head herdsman of the College Farm was a fellow Scot and a sportsman. He was taking a string of cattle to the Show, and it was arranged that I, along with a partner in crime, should be secreted in a truck among sacks of feedingstuffs and bales of hay. The outward journey was uneventful and we collected, for the purpose of our thesis, the weights and measurements of a goodly number of prize-winning cattle.

On the return journey the stock of fodder was naturally much reduced, so that an increased degree of caution was called for. We laid in provisions for the thirty-six hour journey, hid ourselves as well as might be, and hoped

for the best. As it happened, no railway official was so inquisitive as to explore the situation. What did happen was that we struck a blizzard and arrived at our destination fully twenty-four hours after we had eaten our last biscuit. I remember very well the taste of a particular pork chop !

Professor Sir James A. Scott Watson

* * *

WHEN, in 1910, I embarked upon a career in agricultural botany, permanent grass held sway and by the generality of agriculturists was deemed to be a great blessing and in no wise a menace. I started by paying due deference to permanent grass, and my keenest memories are of the time when slowly, and hesitantly at first, I for one woke up to the national evil inherent in permanent grass, and the still greater evils inherent in so-called rough grazings and waste land. My mind goes back to the outrun sainfoin leys of the Cotswolds—a welter of dandelions and lop grass ; to the miserable permanent pastures of lowland Wales so largely grazed to death by sheep in winter, and to the bracken and other waste land in the Welsh hills.

My conversion to sanity was not complete, however, until in the 1914-18 war I was given the task and the opportunity of investigating the best permanent pastures in England. My reaction was to become possessed of a positive passion to plough them all up and make of the Midland pastures first a war-time wheat belt and later an area of arable-cum-leys. The idea was not mad, but the timing fantastically premature. My abiding memory of those long ago days is the kindly and amused smile on the face of Sir Thomas Middleton (my chief at the then Food Production Department), when with great charm and at great length and for " excellent reasons " he turned down my proposal.

By 1930 I was myself in charge of experiments in land reclamation and reseeding, and already there were a number of far-seeing landowners and farmers who were enthusiastically interested. A beginning was made which was to culminate in the great plough-up of 1940-43. To me, the excitement of the early endeavours before the war was far greater than those of our massive war-time achievements. In the earlier years those of us who were interested had little but each others' enthusiasm to draw upon. By comparison, everything was made easy and more or less standard practice during the war years. What had started as carefree adventure had become an organized operation of war.

Sir R. George Stapledon

* * *

THE year 1919 may well be regarded as marking the inauguration of the schemes for research and advice in agriculture and horticulture which have given rise to the present-day research stations and the National Agricultural Advisory Service. At that time the scientific staff of Long Ashton totalled seven and, of these, three—the chemist, entomologist and mycologist—had dual roles of research workers and advisory officers.

I think it was in 1920 that the Ministry of Agriculture called the first meeting of Advisory Officers from the newly-established Provincial Advisory Centres in one of the Conference Rooms at 10 Whitehall Place. Sir Daniel Hall, if I remember rightly, was chairman, ably supported by Sir Thomas Middleton. What I do recall most clearly was that two advisory officers wore morning suits—F. V. Theobald (complete with top hat) and H. P. Hutchinson (in a less formal bowler). There were other distinctive, though

less immaculate, fashions on that occasion, but this will suffice to set the standard to the N.A.A.S. !

Soil surveys were an early topic of the Advisory Chemists' Conference. Did they serve any useful purpose ? What heresy ! The question was raised by A. B. Bruce, an officer of the Ministry. It was held that Hall and Russell's survey of the Lower Greensand areas of Kent, Surrey and Sussex had shown that soil surveys were not likely to be of much use to farmers. Sir Thomas Middleton, a keen geologist, strongly supported soil surveys, and referred to the Kent survey as merely a " bag survey "—based, that is, only on samples of surface soil and subsoil, and not a field study of soil characters.

A. B. Bruce eventually threw out the challenge to the chemists to show that clear relationships did exist between crops and soils. I undertook to show this for fruit crops. The result was the formation of a Fruit Soils Survey Committee, under the chairmanship of Professor B. T. P. Barker, to examine the problem in the West Midlands and Wisbech fruit areas. This work was later extended to other fruit-growing districts, and resulted in the publication by the Ministry of a series of Bulletins and Monographs.

It is of interest to note that in the early soil surveys motor cars were little in evidence ; journeys had to be made by train, bus, taxi, motor cycle and even by bicycle. Think of this, you modern surveyors, when gathering together your rubber boots, auger, spade, pick, soil bags and mapping case, and packing them into the car !

That the foundations laid by the early pioneers in the research and advisory services were sound is abundantly clear today, both to those who serve in them and to the farming community.

Professor T. Wallace

* * *

Mr. Alfred Stevenson, of Market Deeping, Lincs., aged 70, has a personal Diamond Jubilee this year. Since the age of 10 he has worked full-time on Six Score Farm, an isolated fen holding of 300 acres on the borders of Holland and Kesteven—an achievement which has earned for him the award of the Lincolnshire Agricultural Society's Certificate of Merit.

I WAS eight when I first went to work at Six Score—keeping crows off peas at that time of the year for about 6d. a day. I only went to school odd days. The children in Deeping had to go, but living in the Fens, we could not be forced. But I can reckon up anything in my head—or could do when I was young. There were twenty-four horses on the farm in those days, and three horsemen and a foreman in the farmhouse. The head horseman got his keep, £19 a year and 9s. 6d. a week ; the second £13 and 9s.; and the third £7 10s. and 9s. The rest of the men came from Deeping every day—as many as twelve or fifteen in the summer. Some had cycles, but some walked. The hours were half-past six to half-past five, with half an hour for lunch and an hour for dinner. They got half-a-crown a day in the summer and 2s. 3d. in the winter, with no holidays except what they took (i.e., without pay) and nothing for wet times. They worked all day Saturday. Sometimes in winter there would be more than 100 men in Deeping without work.

Six Score was much the same then as it is now—nearly all plough and little grass. But they grew more corn—a lot of oats and a nice lot of wheat—and less potatoes. The wheat was Squarehead's Master and Little Joss, and 5–6 qr. was reckoned to be a very good crop. The potatoes were Northern

Star and Up-to-Date, and they did well to get 9 or 10 tons. We always mowed the oats by hand, as they said it made the straw better. The rest was cut with a sail reaper. In a dry time we had to tie in the evening or the bands would break. Many times I've heard Deeping clock strike midnight when I was in the field. One wet time we mowed and tied 250 acres by hand because the reaper wouldn't go.

Sheep were run on cole seed in the backend and winter—as many as 500 or 600, and all Longwools. Also there were joisted (agisted) cattle out of Leicestershire in the yards. They were big beasts with long horns and brown and white on the face. They got mangolds, cake and wheat and oat straw ; the hay from a field or two of seeds was always baled and sold.

There was no water in the Fen when I was a boy. It all had to be carted from Deeping. The roads were very rough, and I've known a horse to go down and break its back. There was no postman ; you had to fetch your own letters from Deeping or Langtoft. The baker and the butcher came once a week.

Times in my early days were nowhere as good as they are now, and I wouldn't have them back again. But meat was only 4½d. a lb., 'baccy 3d. an ounce, and beer 2d. a pint—better stuff than you get for 1s. 4d. today ! You could get a suit for £1 that would cost £11 now—and they'd bring it down the Fen to sell it to you, too !

Alfred Stevenson

THEN AND NOW

AMONG the many changes in British agriculture over the past sixty years perhaps the greatest has been the comparatively recent swing to increased mechanization. This trend is clearly brought out in the machinery census figure for England and Wales :

	June 1939 *Estimated*	Jan. 1954
Tractors : agricultural	50,000	334,390
: horticultural		58,330
Combine harvesters	150	21,120
Milking machines	23,860	90,740

And this, of course, has had its effect on the farm horse population

	1894	1954*
	thousands	
Horses kept on agricultural land	1,324	255
Horses (solely agricultural)	857	154

Among other farm livestock, the most notable changes since 1894 has been the decline in sheep numbers and the increase in pigs and poultry.

	1894	1954
	thousands	
Cows and heifers	2,031	3,596
Cattle and calves (total)	5,146	8,070
Sheep and lambs	18,589	14,480
Pigs	2,241	4,864
Poultry	32,232†	63,558

* All 1954 figures are provisional.
† Total for 1908. No figures available for previous years.

Compare, too, the size of the labour force today with that in the early part of the century :

	1908*	1954
	thousands	
Regular labour : male	508	464.3
female	68	42.7
Casual labour	146	151.6
Total workers	722	658.6

This decrease in the number of farm workers becomes more significant when it is realized that in 1908 the population of England and Wales was only 32½ million (29¼ million in 1894). In the most recent census (1951) it was over 43½ million.

How have the farm cropping systems in England and Wales developed in the last sixty years ? In 1894 it is recorded that permanent pasture accounted for 53 per cent of the total agricultural land (that is, total acreage under crops, bare fallow and grass) in England and 69 per cent in Wales. The comparable figures for 1953 were 41 per cent in England and 61 per cent in Wales. On the arable land, corn was undoubtedly the main crop, occupying 52 per cent in England and 48 per cent in Wales. It is interesting to note that corn is still grown on about 49 per cent of the arable land of England and Wales today, although the emphasis has changed as between the different grains, and yields per acre have been increased substantially. The estimated average yields per acre of the principal crops in the 1894 and 1953 harvests were :

	England and Wales	
	1894	1953
Wheat	16.4 cwt.	24.0 cwt.
Barley	17.2 „	22.6 „
Oats	15.2 „	21.2 „
Potatoes	5.8 tons	8.7 tons
Mangolds	18.5 „	25.7 „
Turnips and Swedes	13.6 „	17.8 „
Hay (permanent pasture)	28.5 cwt.	22.5 cwt.

In comparing the acreages given to farm crops today with those of 1894, some changes, as in oats, sugar beet, permanent grass and bare fallow, are less remarkable than the considerable decline in the areas of hops and small fruit.

	England and Wales	
	1894	1954
	thousand acres	
Wheat	1,883	2,367
Barley	1,878	1,863
Oats	2,229	1,480
Mixed corn	—	797
Potatoes	375	650
Sugar beet	42 acres	404
Temporary grass (incl. clover and sainfoin)	2,926	3,871
Bare fallow	368	268
Small fruit	63.5	43
Orchards	212	268
Hops	59.5	21
Total arable land (incl. temporary grass)	12,627	13,681
Permanent grass	15,111	10,778
Rough grazing	3,041 (approx. area)	5,243
Total acreage of crops and grass (excl. rough grazing)	27,738	24,514

Market prices in 1894 were the lowest for many years, reflecting the slump that had affected agriculture both in this country and North America.

* Figures exclude occupiers' families working on farms. Earlier figures are not available.

Average prices in Britain were :

Wheat	2*s.* 10½*d.* per imperial bushel
Barley	3*s.* 0½*d.* " "
Oats	2*s.* 1½*d.* " "
Fat cattle (1st quality)	32*s.*–38*s.* 6*d.* per cwt. live weight
Sheep (1st quality)	9*d.* per lb. live weight
Wool (British)	5*d.*–1*s.* 1*d.* per lb.

Finally, let us glance at the field of finance. The Finance Act of 1894 provided that income tax should be chargeable on the annual value or rack rent of lands under Schedule A in respect of ownership, and under Schedule B in respect of profits. The tax-free limit was fixed at £160. Above that, the rate of tax was 8d. under Schedule A, and 3d. under Schedule B. But perhaps it is kinder not to seek present-day comparisons in this instance !

L.W.T.

BOOK REVIEWS

The Limits of the Earth. FAIRFIELD OSBORN. Faber. 12s. 6d.

Mr. Fairfield Osborn is known for his previous work *Our Plundered Planet*, and this agricultural study brings the story up to date. The theme is the well-known one that the population is growing at too fast a rate and that it will soon outstrip our resources, particularly our agricultural resources. Though this is well known among a large section of the community, it cannot be too well or widely known, and *The Limits of the Earth* states the problem in an admirably concise and direct manner. " The purpose of this book," says the author, " is to stress the influence . . . exerted by the relationship between people and the resources of the earth."

The agricultural conditions of five continents are covered, together with the possibility of expanding production in those zones, and the two final chapters, which examine the alternative sources of food that service may make available, are of particular interest.

What is lacking, and what is frequently lacking in this type of book, is some explanation of the fact that though there is a food shortage, yet in certain areas of the world, particularly North America, there are enormous surpluses which are causing Governments much concern; and, moreover, there are schemes on foot, such as the quota arrangements for sugar production, which will restrict production. These facts tend to obscure the layman's appreciation of the serious situation that is arising, and they should not be ignored. We may not always agree with Mr. Osborn, but we cannot but admire his clear and concise writing ; points of disagreement may well arise from its very conciseness ; for instance, did not the nations (e.g., the Romans) turn outwards to the conquest of others not because their soil was exhausted but rather because it was an easier way of getting their food and luxuries ?

The book is a well-produced reprint of the American edition and contains an admirable bibliography.

G.O.

The Pests of Fruit and Hops. (3rd Edition). A. M. MASSEE. Crosby Lockwood. 25s.

During the last eight or ten years there have been such great changes in the control of orchard pests that this new and up-to-date edition of Dr. Massee's well-known book will be widely and warmly welcomed. In his foreword, which really leaves the reviewer very little to say, Professor Wigglesworth remarks of the book that " For seventeen years it has been the entomological bible of the fruit-grower." It has been even more, for the same period it has been the standby of many an advisory entomologist.

The present edition follows the same pattern as the earlier ones, but every chapter has been thoroughly revised ; three completely rewritten. The important fruit crops are dealt with in alphabetical order and the more important pests quite clearly indicated—all of which facilitates rapid and easy reference. The major changes in the book concern control measures, but it is also of much interest to notice the changes in the status of several pests brought about by the introduction of new insecticides. Whereas the Fruit Tree Red Spider mite appears to have greatly increased in importance following certain spray programmes, Apple Blossom weevil and Apple sawfly can now be so well con-

trolled that they are really only potentially important. The Summer Fruit tortricid, which first appeared in England in 1950, is dealt with for the first time.

Of the three chapters which have been rewritten, one on insecticides is by Mr. R. P. Tew, another is on machinery and equipment by Mr. Geoffrey Fletcher, and the third on beneficial and harmless insects is by Dr. Massee. These chapters on insecticides and equipment, when compared with those in the earlier editions, show very clearly how complicated has become the problem of crop protection. It is, however, Dr. Massee's chapter on beneficial insects which most clearly indicates that we have a lot to learn about orchard pests. We can recognize most of the pests encountered and the expert can recognize many of the beneficial insects ; we know a good deal about insects' life cycles and of how to kill them, but we know very little about their inter-relationships. Throughout his book, Dr. Massee, while very rightly making it clear that these inter-relationships are of fundamental importance in successful pest control, does not underestimate the value of the chemist's contribution.

Dr. Massee and his colleagues are to be heartily congratulated on this excellent book, and the publishers for the quality of the plates and the good clear type.

F.H.J.

Profitable Culture of Vegetables (3rd Edition). THOMAS SMITH. Longmans Green. 25s.

This third edition, edited and greatly revised by Jeffrey Rhodes, is assured of a wide welcome. In three parts, the book deals with choice of site, soils, manuring, mechanization and cultivations, sowing and transplanting, forcing and protecting, French gardening, Dutch lights and cloches, irrigation and weed control. Forty-eight salad and vegetable crops are given individual cultural treatment, together with grading, packing and marketing, reference to pests and diseases, and much other information of value to the commercial grower.

Soil and its treatment is excellent, and while it is refreshing to find "digging" included, surely little is done nowadays ; the spade has become obsolete on the majority of holdings. The inclusion with diagrammatic details of a "scrubber" is of great interest. The introduction of short-term leys to the vegetable rotation is of great importance, and the example provided is extremely useful. The section discussing mechanical aids has obviously been enlarged and illustrated to good advantage, and is now a valuable chapter.

Also excellent is the chapter on seeds, sowing, thinning and transplanting, with good illustrations of tools and equipment required. Soil blocks are mentioned but could with advantage have been given more space. French gardening offers a number of aspects unfamiliar to most market gardeners. The description of *terreau* is rather misleading, since the English interpretation is of a material in a much more advanced state of decomposition than that described. Irrigation and the control of weeds are dealt with briefly, but offer sufficient without being too technical.

The book is extremely well written and illustrated and, although its price is rather high, it should become a constant reference for growers and students.

J.H.

The Principles of Dairy Farming. KENNETH RUSSELL. Dairy Farmer (Books) Ltd. 25s.

Carefully written in a language that can be easily understood by any who are interested in the subject, this practical book contains a wealth of scientific knowledge. The author must be congratulated upon the amount of information that he has packed into its 278 pages ; it is difficult to find any aspect of dairy farming that has not been mentioned. All who are engaged in milk production or contemplate doing so, should read it.

Some reference must be made, however, to the author's enthusiasm for feeding roots to dairy stock, especially when one remembers that he is Vice-Principal of the Royal Agricultural College, Cirencester. Kenneth Russell is also a keen advocate of the feeding of kale and of using it for strip grazing wherever the soil is suitable. The necessity of saving labour whenever possible is always present in his mind.

Perhaps a little more might have been said about mastitis, its prevention and treatment. Also in a further edition (and it is quite certain that other editions will be called for) a special chapter on clean milk production might make it easy to study this subject, but it must be admitted that most of the material has already been dispersed throughout the book.

This excellent book is fully illustrated by many fine photographs and some excellent drawings, but one would have liked to have seen direct reference in the text to the photographs. The bibliography is excellent, and will enable anyone who wishes to study the subject further, to do so with the minimum of effort. There are many valuable tables in the appendices.

F.H.G.

Beef Cattle Husbandry. ALLAN FRASER. Crosby Lockwood. 18s.

World supplies, agricultural policy, breed histories, breed societies, hill farming past and present, summer and winter fattening of cattle and agricultural science are all deftly woven into this very readable study of beef production. But perhaps of most interest are Dr. Fraser's thoughts about the future. Will, for instance, the Cambridge calf-rearing experiments eventually support the tentative conclusions now held, that a favourable early environment contributes much more to a good carcass of beef than anything else? If so, then exactly how much does the bull matter? These experiments confirm beyond reasonable doubt that the progeny of certain of our dairy breeds can produce good beef. The policy of using colour-marking bulls favours the Aberdeen-Angus and Hereford, although the Beef Shorthorn, which does not possess this quality, may under some circumstances be a better sire.

What is the future of these great beef breeds? All would suffer if the export trade dried up, but most of all the Beef Shorthorn. Again, is the present popularity of the Hereford the result of our national meat policy over the last fourteen years? How will it fit in with future conditions?

Dr. Fraser freely acknowledges the great contribution that suitably reared surplus calves from the national milk herd have to make to our future supplies. He is, however, less ready to agree that our hills can become the reservoir from which great streams of store cattle will flow. But much more could be done, he thinks, if resources like those now possessed by the Forestry Commission were given to a Hill Cattle Commission. This is an intriguing thought. Wherever our stores come from, the author is strongly in favour of summer fattening off grass. In his view, adequate abattoirs and cold storage facilities are essential concomitants to such a policy.

This book is, above all, provocative. It overflows with thoughtful ideas which should be examined by all who have a stake in our beef cattle industry.

H.E.

The Production and Marketing of Pigs (2nd Edition). H. R. DAVIDSON. Longmans. 40s.

Few readers of *Agriculture* will be unfamiliar with this book, and it is indicative of its appeal that in such a relatively short time a second edition has been required. Since the book was first published in 1948, the pig industry has been searching for a *modus vivendi* and there has been need for fundamental data on which to base policies and production. This book provides a lively background for such purposes. Mr. Davidson's own experiences as student, teacher, research worker, farmer and journalist have given him an awareness of the needs of each of these groups, and a minor criticism of an outstanding book might be to say that it suffers from an *embarras de richesse* in catering for all these within its covers.

The book falls into three parts. Part I deals with general and economic considerations affecting pig production. Part II, which deals with theoretical and technical considerations, may prove rather heavy going for the practical man, but he will be rewarded amply in reading and applying the very sound information and observations embodied in the practical aspects of management which comprise Part III. No doubt he will be able to add to his understanding of the practical aspects by absorbing a good deal of the second part.

There are no major alterations in the text, but the opportunity has been taken to make a number of amendments rendered necessary by the march of time, to refer to the work of developing new breeds initiated by Professor L. M. Winters of Minnesota University and to provide an addendum dealing with the important subjects of the Animal Protein Factor and antibiotics.

The Production and Marketing of Pigs has come to be rightly recognized as a standard work of reference; the second edition undoubtedly confirms this earlier assessment.

J.W.R.

The Feeding of Farm Livestock (3rd Edition). J. C. B. ELLIS. Crosby Lockwood. 21s.

The modern student of animal nutrition has a much wider choice of text-books than was the case with students of the science some twenty or thirty years ago. Kellner and Armsby held sway in those earlier days, and although the text-books associated with those illustrious names gave admirable presentations of the scientific aspects of animal feeding as seen from the German and American standpoints, the need for a text-book taking into account the special British outlook was always felt. This need has been amply met in recent years, and among the books compiled during this period by British authors, the volume under review holds an honourable place.

A detailed description of the general layout of the treatise is scarcely necessary, since following the publication of the first edition in 1937, it quickly attracted the attention not only of teachers and students of animal nutrition, but of numerous members of the farming community as well. A second revised edition was called for in 1947, and this has now been succeeded by a third and enlarged edition. The main purpose of this new version remains the same as was in the mind of the author during the preparation of the original edition, namely, to explain and illustrate how farm animals may be rationed on an economical yet efficient basis by the use of tables in which both food values and food requirements are stated in terms of starch equivalent and protein equivalent. All the main features of the earlier editions have been retained, but the subject matter has been brought up to date in the light of the results of recent nutritional investigations. As an example of this, reference may be made to the inclusion of a new section dealing with the use of antibiotics in the feeding of pigs and poultry. Timely attention has also been devoted to the production and efficient utilization of the farm-grown bulky foods, including pasture herbage, the different kinds of hay and straw, the roots and tubers, silage and dried grass.

The result is a textbook which can confidently be recommended to student and farmer alike, coming, as it does (to quote from the foreword by Sir James Scott Watson) " at a time when, with the end of a long period of feedingstuff rationing, the stockfeeder has many opportunities of exercising his old skill and applying modern science."

H.E.W.

Vale of Evesham : An Economic Study : Cropping Year 1951-52. E. B. FEKETE. Department of Agricultural Economics, University of Bristol. 5s.

A third report for the cropping year 1951-52 upon economic conditions prevailing in the Vale of Evesham has been issued by the Department of Agricultural Economics at Bristol. The principal aim of these surveys is to obtain data on management from growers in different parts of the Vale with holdings of varying size and of different types of cultivation, and then present in the form of a report a fairly representative picture of the average results which have been achieved during the year in question.

The report is divided into two parts ; the first deals with the general statistical conditions of the Evesham and Pershore districts, which constitute the major part of the Vale of Evesham, and the second part gives an account of the financial results. From the analysis made, a clear picture is presented of the parishes where the different kinds of vegetables and fruit are concentrated.

The acreage of agricultural land in the *entire* region, excluding a very large number of holdings of less than 1 acre, which have not been taken into account, amounts to 101,658 acres, split up amongst 2,774 holdings. Of these, 1,166 are under 5 acres, and 565 between 5 and 10 acres : only 281 of the remaining 1,043 holdings are over 100 acres. The survey, which was based on the voluntary co-operation of 71 growers, showed that the total production of these particular 71 holdings averaged £142 per acre, of which £74 was derived from vegetables and £45 from fruit. The 1-5 and the 10-20 acre groups achieved the highest average production of £231 and £198 respectively, the highest actual production in the 1-5 acre group being £574 and the lowest £80 per acre. The lowest average production was on the 20-50 acre holding (£127 per acre).

The average financial return from 327 acres of vegetable crops under review in the survey was £169 per acre, and that for 83 acres of soft fruit was £116 per acre. Blackberries provided the highest financial return per acre with strawberries second and raspberries third.

A section of the report gives an account of costs. This shows that labour is the most important factor in the whole cost structure. In the survey the wages bill, together with the value assessed for unpaid labour, absorbed 55 per cent of the total cost. Miscellaneous bills, which include a great variety of payments such as repairs and renewals, rates, water charges, contract work, market expenses, and sundry overhead costs, accounted for 14 per cent. Crop expenses, including seeds, plants, trees, fertilizers and insecticides, represented 12 per cent, and maintenance costs of machinery and implements amounted to 11 per cent of the total costs.

The whole report, which runs to 114 pages and contains 57 tables of statistics, gives a comprehensive picture of the economic position of the horticultural industry in the Vale of Evesham—a highly specialized district for fruit and vegetable production. The growing of typical crops is mixed to a varying degree according to local techniques and long-standing traditions, and it is pointed out by Dr. Fekete that these may differ entirely from the practice in other horticultural districts.

W.G.H.

The World of the Honeybee. COLIN G. BUTLER. Collins. 21s.

This is a notable addition to the " New Naturalist " series. Dr. Butler has gathered together the fruits of wide reading, and of his own observations and researches, to present the reader with a rich harvest of knowledge, spiced with stimulating speculation, about the evolution, natural history and behaviour of honeybees, both socially as members of closely-knit communities and individually as foragers in the field. For good measure he has embellished the book with a fine collection of photographs, many of them of great beauty and all of his own taking.

The introductory chapters are concerned with the origin of honeybees and their relationship to other insects, the distribution of the four existing species of honeybee and the evolution of social life in the *Hymenoptera*. Particularly interesting are the references to the three Asiatic species of honeybee, which the author had the opportunity of studying in their native environment during a recent visit to Ceylon, and the comparisons he makes between their habits and those of our own Western honeybee.

Much of our present knowledge of the impact of the external world upon the senses of the worker honeybee is derived from the elegant researches of von Frisch on the "language" of bees. All this, together with a critical discussion of the contributions of fellow workers in this field, finds its place in this new volume. The most original part of the text, however, consists of a series of chapters on the queen bee and the part she plays in the cohesion of the colony as a social unit.

Dr. Butler has demonstrated experimentally the existence of a " queen substance " which some of the workers obtain by physical contact with her body and subsequently share with their fellows. On the hypothesis that worker bees have an innate desire for " queen substance," the well-known fact that a colony quickly becomes aware of the absence of its queen can be explained in terms of a dwindling amount of this very desirable currency in circulation among its members. Similarly, " queen substance," or the lack of it, can be regarded as being of fundamental importance in relation to the production of queen larvae, either as an emergency measure when the colony suddenly becomes queenless or as a preparation for the act of swarming off with the old queen. Students of social behaviour in insects will look forward with great interest to the results of further work based on the " queen substance " theory. In the meantime, the skilful and fascinating experiments described here will certainly give the general reader a clear appreciation of the difficulties to be overcome in attempting to fill the gaps in our picture of the world as seen through the very different eye of the honeybee.

P.S.M.

The Northern Marches. (Regional Books Series). CLEDWYN HUGHES. Hale. 18s.

There is a wealth of information of absorbing interest in this book, delightful anecdotes, and descriptions of country customs, pastimes and folklore, much of it written with poetic Celtic imagery, but because there is little or no logical sequence in its presentation it is difficult to appraise fairly. For instance, on one page alone the reader is required to jump from Brains Trusts to jam-making and from earthquakes since A.D. 1010 to country girls' clothes. The result is a patchwork which can be rather irritating and is apt to leave the reader with little appreciation of the Marches as an entity.

Although the Marchland is predominantly rural, agriculturally the book is disappointing. There is little description of the many and varied forms of cropping and stocking practised in the area, and sometimes the information is misleading, as when it is stated that Welsh Black cattle are kept on the hill farms for butter production, quite disregarding the important store cattle industry. Again, the bald statement is made that pigs are reared in the area, with no mention of the facts that while pig rearing is extensive and important in the English cheese-making districts, in many areas the other side of the border there is a strange reluctance to rear pigs at all.

When dealing with local history, the author is excellent, especially in the second part of the book, which is not marred, as are so many books of a similar nature, by over-devotion to church architecture and furnishings. When he comes to the human relationships of the border lands he is, however, perhaps not quite so convincing, and is inclined to overemphasize the smoothness of the transition from Welsh to English customs and habits. It is smooth enough in the industrial districts, but the fierce independence of much of the Welsh rural borderland shows that the old " Border spirit " is still very much alive.

To sum up, this is a very worthwhile book, despite its minor faults. I am very glad to have read it, and shall certainly do so again.

J.R.W.J.

The Weald of Kent and Sussex. (Regional Books Series). SHEILA KAYE-SMITH. Hale. 18s.

The Weald, the author explains, is " roughly speaking that part of England lying between the North and South Downs." Although, in the house-agents' phrase, " within easy reach of London," its rural charms are not as well known as they deserve to be. Miss Kaye-Smith, who has lived in Rye for many years, and has known the Weald all her life, does much in this very readable book to remedy the omission.

This, perhaps the oldest part of England, is rich in historical and topographical interest. In Saxon times the whole area was covered by a vast, almost impenetrable forest— Andredsweald, " the wood where nobody dwells." The swineherds of those far-off days, however, laid the foundations of the present agricultural prosperity of the region when they took their charges into the forest clearings to feed on the acorns that there abounded. Human settlements followed the pigs into the forest, and from the enclosed swine pastures or "dens" of the Saxons derive all the "dens" of the Weald—Benenden, Tenterden, Bethersden, Rolvenden, and the rest—470 in Kent alone, according to Furley in his *History of the Weald of Kent*.

" After the hogs, the hops." From the primitive Saxon agriculture of the swineherd there have, over the centuries, developed the flourishing modern industries of hop- and fruit-growing for which the Weald is justly famous today. Miss Kaye-Smith traces this progress in a fascinating way, showing how between the two extremes other industries now more readily associated with the Black Country—iron-smelting, cloth-weaving, and pottery-making—flourished in the region ; and how relics of these bygone crafts are still to be found in the lovely domestic architecture of the cloth-halls and master-weavers' houses around Cranbrook, and the hammer ponds that drove the mills in many districts.

The book is divided into two parts : the first is in the nature of an itinerary which introduces the reader to little-known villages and by-ways, and by means of the little single track railways with which the big railway companies opened up the rural areas behind their main lines in Victorian days, takes him through scenery unspoiled by roads. Unhappily, many of these lines are now closed to passenger traffic and so Miss Kaye-Smith's " conducted tours " can no longer be faithfully followed. The second part deals more generally with the history, industries, religions, and superstitions of the Weald, gives some information about local dialect, place-names, and the few regional dishes that still survive.

A delightful book full of interest for both those who are fortunate enough to live in this part of the country, and those who can only visit it on holiday, but one regrets that so little is said about agriculture in the Weald. The book is illustrated with 25 excellent photographs by J. Allan Cash. It also contains a useful index and a small sketch map of the area.

D.M.C.

Peakland (Regional Books Series). CRICHTON PORTEOUS. Hale. 18s.

Mr. Porteous obviously has a deep and genuine love of the Peak District. "I shall never see anywhere more beautiful . . .", he says of the approaches to Ilam. All his literary skill has therefore been applied enthusiastically to the writing of this book. Conscientious research, combined with a wealth of local lore, has produced a delightfully intimate portrait of the area. From his descriptive passages one can almost see the wild majesty of the dales and open moors swept by rain or enshrouded in mist.

In form, *Peakland* follows closely on traditional guide-book lines. We are taken through the towns—the Matlocks, Bakewell and Buxton ; escorted into beautiful Dovedale and the delectable Manifold valley ; shown round the ancient homes—Haddon Hall and Chatsworth House, the latter the most visited mansion in Britain. We are introduced to the ancient crafts and industries that once flourished in the quiet of clough and dale ; we learn of Derbyshire's historical associations, of its archaeology, geology and architecture. But, as so frequently happens when enthusiasm is the guiding spirit, the account may at times make heavy reading for the uninitiated. Historical data, with an especial pre-occupation with prices, costs and wages, are packed into its pages, which some readers may find tedious in a book of this kind.

Finally, I looked in vain for any real mention of Derbyshire's agriculture. That Mr. Porteous is aware of its importance is shown by the statement that " The lime industry in Peakland is second only to agriculture." But, apart from a reference to cheese-making and a picturesque description of a man broadcasting oats, that is about all we get. This is a pity, for the farming features of Derbyshire offer their own attraction and interest to visitors.

L.W.T.

The Forester's Handbook. H. L. EDLIN. Thames and Hudson. 35s.

Here is a compendium of information about current forestry practice, from the collecting of seed to the felling, measuring and marketing of the timber. The silvicultural chapters include advice on fencing and its cost, and there are tables giving information on such subjects as the number of tree seeds to the pound, sizes and ages of planting stock, and numbers of trees to the acre at various spacings and stages of thinning. Other books have covered the same territory, but this Handbook also contains chapters on the fringes of forestry (such as shelter-belts and screens and trees in hedgerows, parks and gardens), also on the Government grants and income tax reliefs available. There is an excellent bibliography.

As the Forestry Commission's Publication Officer, the author is a recognized authority, and this book (which is not "official") should be of use to many people, perhaps especially to those landowners who have small areas of woodland which they tend themselves or with the help of a working woodsman. The only major adverse criticism arises out of this point. While the book should mainly be useful to the man who has taken neither a degree nor a two-year foresters' course, it treats more of the policy and practice current in the State service than of the particular problems and practices which belong to small private woodlands where there is no fully qualified forester in charge. More might have been said about natural regeneration techniques, about methods of rehabilitating twenty acres of old woodland carrying 20 per cent of a fair stock, about versions of "irregular forestry" and *Dauerwald*. However, the 24 pages on these subjects are good as far as they go, and it might perhaps be argued that the problems involved are so many and various, because of the varying circumstances, that any useful discussion would demand a disproportionate share of space in a book of slightly under 400 pages.

J.D.U.W.

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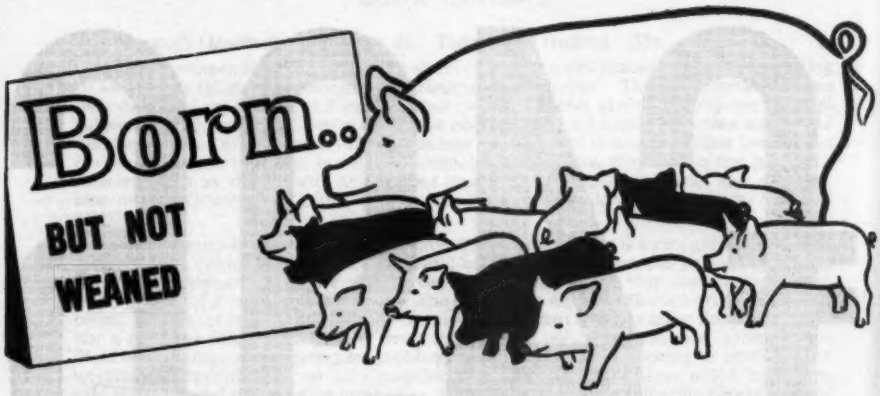

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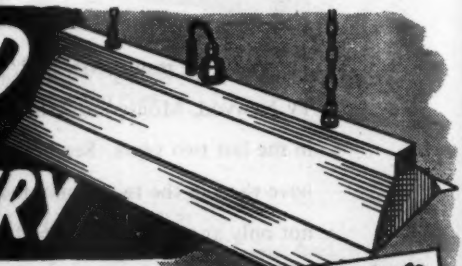

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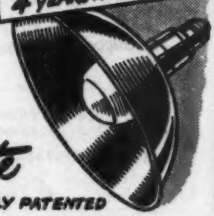

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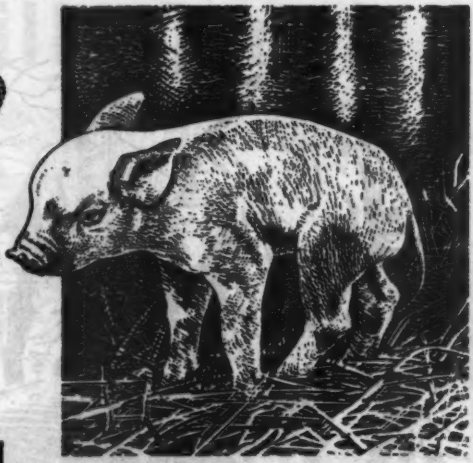

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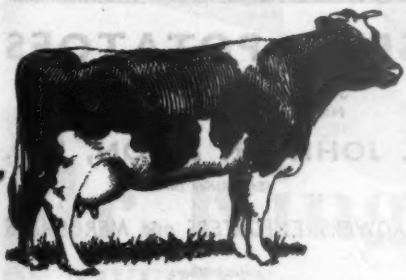

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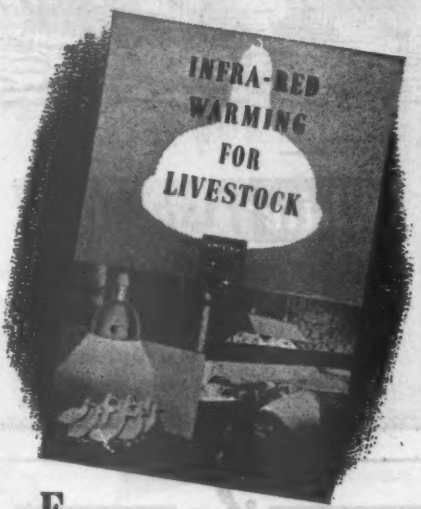

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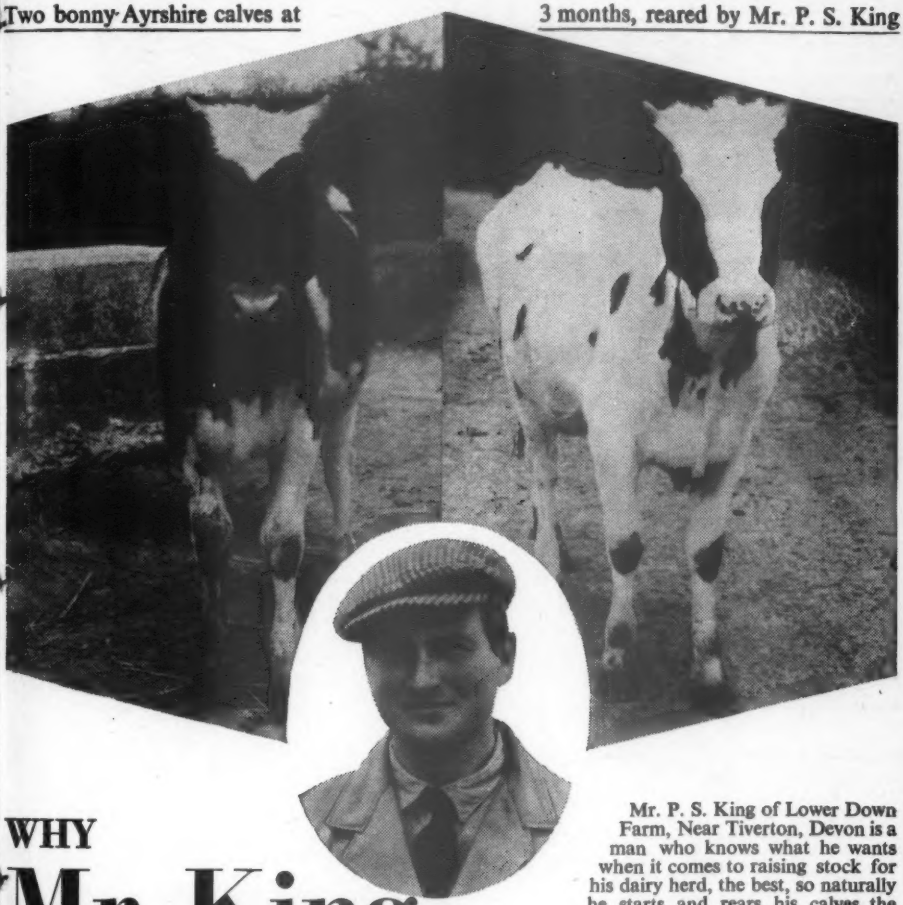

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